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The potential of microblogging as a conduit to promote critical thinking in higher education students

by

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Abstract

This study focuses on the potential contribution of new information communication technologies in higher education, in particular the use of microblogging, in transforming teaching practices to enhance critical thinking skills. Recognising the dearth of critical thinking skills in higher education and its importance in the cultivation of an engaged citizenry which is necessary for the creation of a vibrant and thriving democracy, the study seeks to investigate teaching practices in the higher education sector, utilizing the Community of Inquiry model to examine the possible iterative dialogues between lecturer and students in a first year class , in the form of microblogging posts , for evidence of potential critical engagement. In its finding , the study, whilst not being able to demonstrate significant evidence of higher order thinking, ascribed to the use of the of the microblogging activity , does however support the notion that the microblogging platform offers the potential for critical engagement but emphasizes that this potential , is to a very large degree, dependent on the adoption of appropriate and sound pedagogical strategies .

Keywords

- Critical thinking
- Microblogging
- Community of inquiry
- Critical constructive citizenship

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Declaration

I, Fatima Rahiman, declare that this Masters Research Report is my own unaided work. It is submitted for the Masters in Education degree at the University of the Witwatersrand, Johannesburg, School of Education. It has not been submitted before for any other degree or examination or at any other university.

Signed by:



Fatima Rahiman
7th October 2013

Chapter 1: Problem

Introduction

Foregrounding the recent uptake of emerging information and communication technologies, in particular microblogging in higher education , along with the crucial need for critical thought and inquiry to ensure a critical constructive citizenship , this research seeks to examine whether the adoption of a social networking application i.e microblogging as a course activity has any merit in enhancing the development of critical thinking skills amongst first year students.

Background

Higher education policies and plans worldwide are increasingly influenced by the notion that certain critical, generic skills should be developed in response to the impact of globalization (Slaughter & Leslie, 1999). According to Kraak (1997), these 21st century skills, informed by the demands of an informational economy which is largely dependent on innovation, requires proficiencies of a 'flexible specialisation' type that is responsive and adaptable to a volatile global market. In addition generalised capacities or multi functional skills are required by the new labour force. These skills are also referred to as 'skill portability', implying the ability to transfer the skills or expertise from one work context to the next, as well as 'learning power' , which describes the imperative for independent deep learning beyond schooling(Kraal,1997). A holistic consideration of the skills required in navigating the 21st century workplace necessitates then the production of novel knowledge forms as advocated by the Gibbons thesis which focuses on the external conceptual form of knowledge production (Gibbons, 2004 in Adam 2009). Such knowledge forms are described as the transformation of traditional forms of knowledge to that of a socially distributed, constructed ones aimed at ensuring that knowledge is assessed not only on the basis of scientific criteria but also on its utilitarian and practical value. They are thus characterized by notions of transdisciplinarity, heterogeneity, organisational diversity, increased social accountability and reflexivity with concomitant innovative quality control measures (Waghid 2002). Canagarajah in Hodgkinson-Williams H and

Czerniewicz (2007) also refers to these new knowledge forms as being 'constructed, contextual, value-ridden, discursive and developed collaboratively' and is echoed by Mcfarlane's description on these transformative approaches of both knowledge creation and learning as being ' partial, social, and produced through practices'(Hodgkinson-Williams and Czerniewicz ,2007). Implicit in these new knowledge forms is the need for an active participation involving higher cognitive capacities i.e. critical thinking which forms the basis of this study.

The South African higher education policy environment has not been exempt from this global phenomenon of knowledge transformation, and at the level of policy reflects *both* traditional disciplinary and utilitarian/practical forms of knowledge production in the White Paper on Higher Education (Department of Education [DoE], 1997).

This flexible policy framework, which arose from a very inclusive consultative process, has generated various discourses on the implication for curriculum reform as it attempts to address both local and global concerns. In its broadness of coverage it is thus seen to lend itself to various interpretations of its intent (Adams 2009).

In particular, the knowledge transformation debate is contested on its apparent insular focus on science and technology without due regard for the other professional disciplines on offer at higher education institutions - particularly those in the Humanities and Social Sciences because of the latter's traditional focus on non-utilitarian discourses (Adam 2009). Yet it is precisely these skills which are imparted by the soft sciences disciplines i.e. promotion of critical thought and inquiry that, ironically, are essential for the promotion of the socially distributed character of the new forms of knowledge, in its utilitarian and practical realizations and by its espoused 'responsive capacity'(Kraak, 1997 and Muller,1997). These attributes of the new knowledge forms are aimed at ensuring the development of critical citizens in a complex society beset with global challenges. Kraak (1997) illustrates this by the description of contemporary citizenry as

being one which is “today concerned with the impact on society of a range of techno-political controversies. He describes these as ranging from the “uses made of nuclear power, to industrial pollution and plant safety, to concerns about environmental damage and risks to health caused by hazardous wastes, and to the ethics of genetic engineering” (Kraak, 1997). Underscoring all these laudable initiatives is the need for appropriate teaching as an important conduit in the dissemination as well as the production of these *novel* forms of knowledge through the cultivation of appropriate cognitive capacities.

Aim

Whilst an analysis of the discourses related to the transformation of knowledge are beyond the scope of this paper, one of the emergent key issues from these discourses which are germane to this study, is that of social accountability with its related notion of critical constructive citizenship as described above and introduced early on in the days of the new dispensation by Ekong and Cloete (1997). Elsewhere this notion of the development of critical citizenry and national identity to strengthen democracy is further endorsed (Stetar, 2000).

Transformation in higher education is thus seen as being underpinned by a strongly driven egalitarian and democratic ethos which has an equity imperative based on a sociocultural responsiveness. Indeed as quoted in Waghid (2002) "transformation is not its own goal; the goal is an improved, more just and more equitable society".

Implicit in these notions of reflexive capacity or social accountability and democratic ideals is the assumption of the need for a critical constructive citizenry through the cultivation of cognitive capacity. This is realized through employing appropriate pedagogical approaches which would attempt to foster critical thinking skills – a vital tool, clearly identified by the national policy, needed to deepen democracy (Muller, 1997). Hoppers in Lombard and Grosser (2004) echoes this assertion by pointing out that critical thinking and creativity along with knowledge , skills and values are necessary for democracy building , lifelong learning and to

'promote social building and economic growth in the 21st century'. As obvious as this claim may be, it is interesting to note that Hoppers refers to these cognitive capacities as a *challenge* to higher education transformation suggesting thus that there is a dearth of such capabilities in the South African scenario. This concern is also intimated by Hodgkinson-Williams and Czerniewicz (2007) who highlight the global challenge, which impacts the South African higher education context, of the need for high level knowledge skills in addition to ensuring mere output of graduates. Thus the imperative to investigate new capacities of critical thinking is evinced and it is against this backdrop that this study seeks to explore innovative ways of promoting critical thinking skills in higher education.

Given that Information Communication Technology (ICT) is widely identified as a critical driver of the transformation of knowledge production as it offers new ways of disseminating knowledge as well as providing means to construct and conceive of knowledge differently, this study utilises the microblogging social networking tools spawned by the transformative climate of globalisation viz. Twitter, in an attempt to examine whether this tool can assist in augmenting the development of critical thinking skills through promoting enquiry, reflection and feedback. Whilst cognizant of the limitations that the tool presents in its limited character input method, the study also focusses on its potential use as a *conduit* to extend discussions beyond the classroom for further in-depth discussions in smaller tutorial groups etc. The study thus investigates the teaching practices employed by lecturers utilising the tool and seeks to identify and analyse possible continual iterative dialogues which could be set up between the lecturer and students aided by the short answer format of the Twitter application. This dialogic practice as a pedagogical approach is also articulated by Waghid (2002) who proposes the implementation of a reflexive praxis in the knowledge transformational context to ensure that this knowledge form is socially relevant.

McPeck in Lombard and Gosser (2004) describes critical thinking as consisting of three components viz. ability to engage in reflective questioning with discernment, a strong foundational knowledge in subject area and effective language capacities. The core of critical

thinking though as described by Lombard and Gosser (2004) relates to students' *motivation* to be involved in 'problem situations where reflective skepticism is required'. It is this latter consideration which provides a strong argument for the use of Twitter as part of the students' academic experience, in this study, given the evident widespread adoption of social media activity by students in their personal lives mitigating in favour of enhancing motivation through situating their learning in an authentic environment through use of a familiar tool.

The study also explores to what extent Twitter, in its potential as an application for sharing of information resources and as an access channel to a variety of subject matter experts, opinion makers or thought leaders (Educause Learning Initiative, 2009), can facilitate in the formation of communities of practice - an imperative of higher education knowledge production.

The use of the online application device also functions to problematize the notion of technology through serving to illuminate the implicit/explicit power relations associated with its use viz. issues of physical and epistemic access. The latter relates to the proposed study's exploration of the extent to which students from previously disadvantaged backgrounds and second language learners make use of the online application in the engagement of their course and how and whether this will assist in the development of their literacy and language capabilities. The problematizing notion is also extended to investigate whether the use of online technologies is perceived as a disruptive innovation or welcomed by both educators and learners as a tool to augment their teaching and learning practices.

Research Questions

The study thus attempts to answer the following research questions:
Does the use of Twitter assist in the development of critical thinking skills?

- In particular does it promote enquiry, reflection and feedback?

- Does the limited 140 character input space, aid the writing of concise statements and thus instilling academic rigour in the crafting or culling of succinct statements or does it present a constraint to students to communicate their thoughts?

Does Twitter-use by students provide access to informational resources i.e. to what extent do students exploit the use of Twitter to communicate with experts or search for information etc.?

Does Twitter-use provide for an expanded opportunity for students from previously disadvantaged backgrounds and/or inhibited students to participate more actively?

- Is its use affected by issues of physical access?

Rationale

The study is pursued based on the paucity of evidence relating to the pedagogical effectiveness about the use of microblogging. Whilst there is a considerable amount of research already on technology use and student engagement (Junco et al., 2011) there remains a dearth of studies related to the use of social media as an educational intervention. Where this exist the studies seem to favour a 'cross sectional approach and are correlational in nature' (Junco et al., 2011) hampering the inference of a causal link. This study is thus an attempt to fill this gap or contribute to the sparse extant work by providing evidence attesting (or not) to microblogging's efficacy in teaching and learning practices in our local context .

Echoing the utilitarian focus of the new knowledge production form on which this study is premised, the research thus embodies this principle in its desire to inform elearning practice about the worth of advocating for the use of microblogging applications in the training of academics to augment their teaching and learning practices. Academics are already hard pressed for time and to convince them to invest more of their constrained time to training needs a clear justification of how the innovation , in this case microblogging, can deliver enhanced teaching and learning practices. The study will thus serve to demonstrate the efficacy (or not) of pursing this innovation and the advocating thereof in university wide training programmes.

The use on online microblogging applications is also investigated to explore its potential aid in mitigating the challenges of massification. The findings of this study have significant implications for large classroom pedagogy and could present an expanded learning opportunity whereby students in large classes could engage collaboratively utilising this online medium.

Chapter 2: Literature Review

Introduction

The proposed study necessitates a thorough understanding of the concept 'critical thinking', given its diverse descriptions by several commentators. The core literature on the definition of critical thinking is thus reviewed below, which is then followed by a focus on its psychological development and how the concept of critical thinking relates to the formation of a critically conscious citizen by alluding to its social constructivist component. Following this its significance in higher education along with it's extant usage and relevance in the South African context is then explored. Finally a review of current studies focusing on the use of online learning, particularly microblogging, is explored to investigate whether, and to what extent, its use has facilitated the cultivation of critical thinking. Given the paucity of studies focusing on microblogging specifically, the review includes an examination of other online collaborative tools which are similar in some functions to microblogging and thus allows for me to infer from relevant findings.

The review thus spans three focus areas viz. critical thinking, critical thinking in the South African context and microblogging.

Critical Thinking defined

Doughty (2006) traces the roots of the concept of critical thinking to the ancient Greek intellectuals , of whom some believed in 'immutable truths' whose discovery lay in the sole province of great minds i.e. philosophers. These universal, eternal truths were seen by Plato to be remote from ordinary life and thus by extension inaccessible to ordinary 'man'.

Echoing this musing about the cognitive limitations of pedestrian life, Lipman proffers a description of critical thinking by drawing upon Dewey's distinction between ordinary thinking and reflective thinking - the latter a more pragmatic take on critical thinking based on an

awareness of causes and consequences (Lipman, 2003) with the former described as opinions without evidence (Lombard and Grosser, 2004). Lipman further develops this concept of critical thinking by describing it as "thinking that (1) facilitates judgment because it (2) relies on criteria, (3) is self-correcting, and (4) is sensitive to context" (Lipman, 2003) - a task then which necessitates open-mindedness, exacts reliability and self-reflexivity, thus demanding a culling of thought and concise thinking through the filtering of appropriate criteria (Davey n.d) (as we shall see, it is this latter definition that aids the rationale for the microblogging characteristic style i.e. limited character input method which is the focus of this study.)

The pragmatic aspect of critical thinking which underscores the link between theory and practice is further elucidated by Scriven and Pauls' (1996) oft-cited definition of critical thinking as "'the intellectually disciplined process of actively and skillfully conceptualizing, applying, analyzing, synthesizing and/or evaluating information gathered from, or generated by, observation , experience , reflection, reasoning, or communication as a guide to believe and action" (Scriven and Paul,1996).

Sealing this definition with his stamp of approval is Robert Ennis, proclaimed as the 'father' of critical thinking in contemporary times given his development of the Cornell Critical Thinking Tests along with his concept article in 1962 which prompted a resurgence of interest in critical thinking in academic circles(Ennis, 1962). The article proffered 12 aspects of critical thinking geared to serve as assessment criteria to demonstrate proficiencies of the skill. Ennis further proposed three dimensions of critical thinking i.e. logic, criteria and pragmatism. However two decades later Ennis revised his definition of critical thinking based on criticism that his previous definitions had confused process with product and had also failed to incorporate the potential dispositions of critical thinkers which are needed to deploy critical thinking skills in their lives. His revised succinct and practical definition of critical thinking is : "reasonable reflective thinking about what to believe or do" which apart from embracing the notion of creative thinking as integral to critical thinking also includes the tendency or disposition to use critical thinking skills as opposed to merely having the know-how. (Thayer-Bacon 2000)

Tracing the development of Critical Thinking

This notion of disposition to act on critical thinking is also supported by Paul and Elder (1990) who reflect on the role of the self in cultivating the appropriate character traits in order to execute critical thinking. Their critical thinking model incorporates three components viz. elements of reasoning, intellectual standards and intellectual traits, of which a consistent and rigorous application and honest execution of all three components will ensure the development of a well cultivated critical thinker.

Kuhn (1999) however critiques this disposition construct which implies that critical thinking arises by sheer habit and does not require much effort if one is already predisposed to exercising critical thinking), arguing that people must be 'convinced of the value of doing so' i.e. applying critical thinking skills as 'humans are not simply creatures of habit.' and will only engage if they can see the meaning of what they are doing. She draws on the epistemological development of knowledge forms and focuses on the concept of meta-knowing, described as the intellectual skill most closely associated with critical thinking, as an integral factor promoting disposition. Meta-knowing allows for the creation of meaning, and according to Kuhn(1999), is what is needed for people to apply critical thinking i.e. to reflect and to evaluate.

Kuhn also describes the development of meta-knowing as encompassing three dimensions i.e. metacognitive skills(declarative knowledge), metastrategic skills(procedural knowledge) as well as an epistemological understanding , the latter which is described by a personal philosophical account of how knowing comes to be. This is seen as critical component as it influences the development of the other two dimensions of meta-knowing . She thus defines critical thinking as a developmental phenomenon, with various levels of epistemological understanding acquired during an individual's life, aiding in the understanding of one's thought and assisting in the control thereof. Kuhn stresses therefore the importance of making these critical thinking skills explicit to students if educators wish for them to acquire these effectively whilst acknowledging at the same time that they *are* best taught in the context of a subject

matter and not as a separate isolated subject devoid of meaningful content. She also stresses the importance of regular practice in tandem with the promotion of an understanding or meta-level awareness of these intellectual skills i.e. inquiry, analysis, relevance, inference and argument. This view is also shared by Willingham (2008) who distinguishes critical thinking from ordinary thinking on the basis of the former's focus on deep structures and notes that a familiarity with a problem's deep structures (brought about by repeated application or by various manifestations of the same type of problem i.e. different surface structure but same deep structure) allows for easy transfer to different situations.

Critical Thinking as a Social practice

Kuhn further describes critical thinking as being shaped by "social-practice", a construct which is elsewhere emphasized as a dynamic activity involving both individual analysis and social interaction.. Indeed Lipman (2003) also advocates the worth of the 'community of inquiry' in developing critical thinking skills in the individual which Garrison (1992) eloquently captures in the following : " Thus , it is in the shared world that true meaning is achieved. While constructing meaning is a personal responsibility, the process of critical thinking also includes the application of meaning structures to the specifics of the context. This is, if meaning is to be more than belief it must go beyond simply internal reflection. The truth of concepts is determined through collaborative action which necessitates sharing control of the process".

Critical thinking in the Higher Education Setting

Clearly the subject of critical thinking has generated huge debate and spawned many definitions and ,as described above , is not limited to a mere logical analytical skill but in fact is a complex skill, the impact of which extends far beyond the confines of the very classroom which houses the requisite social setting, for its potential effective execution. Its deeply grounded pragmatic nature along with its emphasis on the social constructivist component, exhort the practitioner/thinker to challenge established theory and practice and in so doing can promote a critical constructive citizenry needed for a flourishing democracy (Muller, 1997).

Thus the need for its promotion in educational settings becomes patently clear if we agree with the goal of higher education institutions as being " to produce graduates that ideally: "can think effectively and critically"; have "achieved depth in some field of knowledge", and have a "critical appreciation of the ways in which we gain knowledge and understanding of the universe, of society, and of ourselves" (Badat,2009)

However one of the main challenges of ensuring the integration of critical thinking skills in the higher education is the confusion as to what actually constitutes critical thinking. Indeed as Lyod and Bahr(2010) point out in their literature review, which is consistent with that of this study's review too, is the various interpretations about critical thinking. They caution that the many inconsistencies in the definition of critical thinking could diminish its value because of the terminological disarray. Ironically though, their study itself found that there were indeed consistencies among academics and students definitions of critical thinking, which were aligned with the extant definitions in current literature. However this finding could be ascribed to the fact that their study sample was pre-service teachers from the Faculty of Education, and thus their cohort could already have been predisposed to notions of critical thinking. Nonetheless they 'cautiously contend(ed) that learning *about* critical thinking may be an essential and complementary strategy to learning *through* critical thinking' (Lloyd and Bard, 2010). This echoes Kuhn's(1993) assertion alluded to earlier regarding the imperative to understand the notion of critical thinking for effective implementation and execution.

Bayer in Lombard and Gosser (2004) alludes to the fact that most of the definitions of critical thinking seem to embody the common notion of the ability to 'collect and utilise information effectively ' - a task that involves the crucial processes of analysis and evaluation. Its use then in the information age is self-evident and more so, in higher learning institutions given the reliance of information retrieved from the Internet. The ability to evaluate along with the deployment of other critical thinking skills such as formulating arguments and exercising reasoned judgment is necessary to ensure the reliability, usefulness and credibility of

information acquired online and so ensure that students are cautious consumers of information (Ling, 2010) .

Indeed as Dewey pointed out "The real problem with intellectual education is the transformation of more or less casual curiosity and sporadic suggestion into attitudes of alert , cautious and thorough inquiry"(1933). Thus the role of educational institutes to foster these cognitive skills is of critical importance to ensure that academics/educators do not focus wholly on teaching students what to think but rather than how to think .

Critical Thinking in the South African context .

Lombard and Grosser (2004) point out the dismal lack of critical thinking skills in many South African learners. They posit various reasons for this which include, amongst other issues, instructivist, transmission modes of teaching; curriculum design which does not focus on cognitive development skills; restrictive climate of learning environment which fails to recognize individuality of learners; assessment methods which focus on regurgitation of facts as opposed to measuring learners competence as thinkers etc. More significantly they identify the role educators play in this pathology and the associated lack of training to equip educators to think critically themselves before teaching learners these skills thus providing the basis for their study which investigates the critical thinking abilities of educators in training. Notwithstanding the acknowledgement of the possible influence on their results due to other variables or factors not considered, Lombard and Grossers (2004) findings present a bleak picture for the South African context in that hardly any of the respondents i.e. prospective educators in their study demonstrated critical thinking abilities. Note that *abilities* differ from the inherent predisposition to think critically or intelligence which is found in all people i.e. critical thinking skills are universal. In recognising the particularities of the South African landscape , their recommendations, among others, include the development of contextualised research instruments tailored for the South African context to assess the critical thinking abilities of the South African society(they had employed the use of the Cornel Critical Thinking test, the

questions of which *were not* subject related) as well as the application of recognized strategies and techniques in educator training programmes which would encourage the adoption of alternative classroom practices suited to cultivating critical thinking.

Utilising a different critical thinking assessment tool viz. Watson Glaser Critical Thinking Appraisal(WGCTA)the same team conducted a study a few years later focusing on first year education students who had been schooled under the former Outcomes Based Education system(OBE) to assess their critical thinking abilities. Their findings reveal little evidence of the OBE system's use in cultivating critical thinking skills in the cohort of students and they ascribe various factors compromising students critical thinking as including language ability, curriculum change, and socio-cultural environment considerations. In particular teachers' teaching practices are highlighted as a major culprit by virtue of the reliance on teacher-centric, non-critical teaching methods where little attention is placed on the construction of knowledge and thinking skills.

The findings on the inadequacies of preservice educators critical thinking skills ability presented in Lombard and Grosser earlier study(2004) is also consistent with that of the Meintjies and Grosser's(2010)study. Drawing on the link between culture and development of creative / critical thinking abilities as described by Nisbett et al(2001), they trace the philosophy of 'Ubuntu' i.e. collective personhood as being antithetical to that of divergent, analytical thought processes which characterizes western culture based on individual self- sufficiency. (I wishs to point out though my uneasiness regarding the issue of the Ubuntu philosophy as being portrayed as being inimical to critical thinking and that I am cognizant of the potential cultural stereotyping embedded in such an assertion.) A critique of this debatable notion is however beyond the scope of this study but it is worthy to mention how 'this issue of whether or not the skills associated with critical thinking are culture specific , and therefore an inappropriate subject of instruction in non-Western contexts'(Long n.d) has been the focus of numerous studies (Kubota, 1999).

Nonetheless in all fairness to Meintjies and Grosser, they do not solely ascribe the lack of critical thinking skills to the adoption of the Ubuntu philosophy but include other contextual factors such as culture, school-models, socio –economic factors and acculturation of parents' as influencing critical or creative thinking skills abilities and thus endorse Lombard's and Grossers recommendation (2009) on the need for creating appropriate contexts conducive to the nurturing of these skills.

It would be prudent at this point to reflect on the evaluative mechanisms employed in the studies above which seem to assess critical thinking in isolation of any domain specific content. This is at odds with contemporary research which suggests that teaching and evaluating critical thinking skills must be done within a specific domain or subject matter (Willingham, 2008).

Use of Microblogs to promote cognitive capacities

It is this latter recommendation regarding the creation of 'appropriate contexts' along with the embracing of alternate teaching approaches that is pertinent to this study's intent which proposes the adoption of online strategies viz. microblogging and hence suggests an altering to the traditional classroom based, instructivist teaching methodology to foster critical thinking skills.

Various studies allude to the hosts of constraints festering in the mode of traditional classroom teaching given the limited time a lecturer has to engage with students individually (Mandernach 2006, Cheong and Cheung, 2008 in Hew, 2010) and which is further compounded by the issue of massification of education. Mandernach, in a later paper (2009) however challenges the implicit bias against traditional modes of teaching and learning practices inherent in the earlier research. Whilst citing numerous studies that argue for the adoption of online learning on the basis that the technological modalities 'may be more conducive to the incorporation of active learning strategies' compared to that of traditional face-to- face classrooms, along with the argument that 'asynchronous learning may be the ONLY path to critical thinking for most

undergraduates'(Pyle 1997 cited in Mandernach, 2009), Mandernach (2009) provides conclusive evidence, to suggest that it is the more the interactive *ability of the instructor* to effectively facilitate discussion that promote critical thinking rather than the medium in which the discussion occurs. Nonetheless, whilst not dismissing the veracity of Mandernach's claim regarding the superiority of an instructors /lecturers facilitating ability i.e. their face-to-face teaching strategies over the teaching medium employed , the educational landscape worldwide, including South Africa, does attest to a growing acceptance and adoption of the use of online learning tools such as social computing tools and processes (DOE 2012).This evolving landscape thus behooves the focus of this study on the potential of the online medium of microblogging. Indeed, as Mandernach(2009) concludes , the online medium is "simply a tool which instructors can use to actively and intentionally promote students increased engagement" and as such, of itself, cannot be, 'seen to inherently prompt students toward enhanced critical thinking.' implying the importance of adopting appropriate teaching strategies. Most educators however tend to teach the way they were taught and are reluctant to adopt alternative teaching strategies that shy away from upholding 'content acquisition over the learning process' (Mandernach, 2006; Lombard and Grosser,2009). Students may therefore, as a result, become inured to factual learning and limit their potential to access higher order cognitive capacities (Mandernach, 2006). Willingham(2008), as previously mentioned, is quite explicit in his espousal of subject matter content not being taught in isolation from critical skills and vice versa arguing that a mere awareness of metacognitive strategies (i.e. the outcome of a general critical thinking programme) is limited in its potential to implement it strategy out of context. Domain knowledge is thus required to effectively execute metacognitive strategies and thus critical thinking. The reversal of this whereby content or domain knowledge is taught without critical thinking skills suffers a similar fate of compromised proficiency in the subject matter. Thus, to ensure the transfer of high order thinking skills, a teaching strategy comprising domain knowledge with embedded metacognitive skills is proposed which has at its core an integral component of student engagement. The potential then to exploit the affordances of emergent technologies such as social media tools becomes evident in our present climate.

As mentioned earlier, the effective integration of online learning thus provides an opportunity to encourage student engagement through extending the interaction time beyond the classroom settings. (Thomas 2002 in Hew 2010; Mandernach 2006; Chen 2010 ;Junco; Dunlap 2009). Online communication tools in particular such as asynchronous discussion tools have been the focus of numerous studies which investigated the level of in depth critical skills exhibited by students engaged in online discussions (Hew et al, 2010). Hew et al (2010) however reports that very few instances of the application and focus on critical thinking skills were found in these studies. They note however that the aspect of facilitated discussions was not investigated and thus draw on this omission to provide the focus of their study i.e. to examine the role of student facilitation in promoting critical thinking. Their results whilst not attesting to an overt causal relationship between facilitation techniques and critical thinking(given the small scale study) , did however allow them to infer that critical thinking could be enhanced through the employment of facilitation techniques such as 'questioning , inviting elaboration and following up on participants' responses.'

In a similar vein, Ling and White's (2010) study highlights the importance of asking the right questions by online moderators in order for students to develop critical thinking skills. They describe the types of Socratic questioning techniques moderators can use which are categorized according to the following five domains i.e. 1) questions of clarification
2) questions that probe assumptions 3) questions that probe reasons and evidence
4) questions about viewpoint and 5) questions that probe implications and consequences. These findings thus suggest the importance of *facilitated* online discussions i.e. the social presence in ensuring the attainment of critical thinking skills. This is congruent with Meads emphasis on the social in the cultivation of critical thinking (Mead, 2010) of which he states that it is only in the "mutual adjustment of social stimulation and response to the activities which they ultimately mediate, can the consciousness of meaning arise" and describes the self as needing symbolic interaction i.e. social communication in order for meaning to be generated.
Little wonder then given its phenomenal growth of online users, estimated to be at 1,382% according to Neilson Online in 2009 with over 500 million users as of 2012, that Twitter, the

microblogging application which is seen as the 'SMS of the Internet'(Dugan, 2012) is rapidly enjoying an emerging role as a pedagogical tool. Its ubiquitous appeal amongst online users potentiates its use as a tool to foster and facilitate student engagement (Saeed and Sinnapen 2011; Junco et al 2011).

Previously dismissed in its early days as a platform hosting vacuous updates of 'unremitting triviality ' (McFedries 2007 cited in Wright 2010) and seen as playground for narcissistic personalities and spamming marketeers, wittily and aptly described as 'miscreants' or evangelists by Krishnamurty et al (2008) due to the behaviour of randomly contacting all and sundry in the hope that they (the spammers) will be followed - an antic aided by the relative anonymity Twitter provides - the Twitter application was seen as an 'impoverished medium lacking social context cues' especially given the brevity of input (140 characters per tweet) it imposes on the communicative act (Elavsky 2010).

The recognition of its potential however has since grown and Wrights (2010) cites its burgeoning and varied use which include, amongst others, as serving as a useful advertising medium, a connecting tool for librarians to communicate with their readers, a social activism tool, a link sharing and live searching tool (Mučnjak, D., & Pikić, A. 2011).Its open API(application programming interface) also affords researchers the opportunity to develop third party applications enabling incisive interrogation of its database to inform on human behaviour (Kwak et al.2010). Wagner & Strohmaier 's (2010) study reveals the latent conceptual structures that emerge in Twitter streams , which arise by messages that are aggregated on the basis of conventions such as hash symbols which tag keywords and thus convey 'meaningful information'. Interestingly, the hashtag use and other conventions on Twitter for e.g., the *retweet* and *Follow Friday* function reported as being initiated by Twitter users prior to its integration into the official interface demonstrates the value of crowd intelligence on this platform (Böhringer, M., & Helmholz, P. 2011).

While its use has not proved popular with youth below the age of 17, with text messaging tools such as IM (Instant Messaging) or SMS (Short Messaging Service) being preferred (Tomita 2009), and in South Africa ,Whatsapp ,Mixit and BBM (BlackBerry Messenger) platforms being the applications of choice for teenagers, Twitter use amongst 18-24 year olds, however, in the US, boasts the largest following. In South Africa, which holds the tenth place worldwide in terms of Twitter use, and is estimated to have approximately 2,4 million users on Twitter according to the latest *South African Social Media Landscape 2012* study, produced by technology market researchers World Wide Worx (2012), there currently is, however, no data available yet in relation to Twitters penetration as far as age group goes. The statistics that *are* available are that of Facebook, the other popular social networking application , which reveal that the highest penetration of this utility is in the 18-24 age group, consistent with that of the US data quoted above. Another significant measure is that the Twitter user base is seen as having the biggest growth rate (next to the purchase of Blackberry phones which are the most popular mobile phones for youth in South Africa according to the World Wide Worx study(2012). Given these compelling statistics measuring Twitters penetration in the South African market, it would not seem to be an unrealistic assumption to surmise that its popularity amongst youth is gaining steady ground, reflecting the global trend in Twitter uptake.

Thus Twitters ostensible penetration into the higher education sector has provided the stimulus for numerous studies investigating its potential benefits as a teaching and learning strategy. Gao et al (2012) provide a critical analysis of twenty one studies conducted over the past four years which focus on microblogging in education. Whilst their findings do suggest a need for more rigorous research into this phenomenon given the varied methodological approaches, it is worth noting that their analysis points to the many potential benefits of microblogging in the educational context which includes encouraging the potential to “participation, engagement, reflective thinking as well as collaborative learning under different learning settings. (Gao et al, 2012).

More importantly though the brevity of the status update (i.e. microblog or tweet) once seen as a constraining factor has been lauded as allowing for focused reflective thinking (Wright 2010) as well as for facilitating student discussion.

Corbett et al's (2008) study on the use of Twitter attests to the utilities potential to facilitate social presence through its capacity to build community. Learners in the study also demonstrated 'self-regulated interest or structure dependent' engagement, which refers to the uppermost taxonomic levels of Hechman & Anabi's(2005) framework of engagement that describes the levels of interest, cognitive effort, and attention learners experience during the learning process. The study however fails to demonstrate as to whether Twitter-use facilitates cognitive understanding (which the authors ascribe to the compromised analytical framework that focused on the *use* of the tool without providing an evaluative means to assess cognition).

Junco's et al (2011) semester-long study, which is in fact the first controlled experimental study on Twitter use, echoes Corbett's (2008) finding in the promotion of student engagement though the use of microblogging. The study also demonstrated a higher semester grade point average by the students who used Twitter i.e. the 'engaged' students. Attention is drawn however to the debatable issue of whether it is was the sole use of Twitter which contributed to the enhanced grades or the possible increased interaction of faculty upon introduction of the Twitter tool to their teaching/learning process. Other limitations include the lack of generalizability of the study sample given its location in an institution which is not reflective of diverse student populations. Nonetheless the study provides a strong motivation to replicate and thus confirm or debunk its findings.

Chapter 3: Theoretical Framework

Introduction

This section articulates the theoretical assumptions under which this study is investigated, and which, when applied, serves further to guide the interpretation of data generated by this study. As such it provides an overview of aspects of the Vygotskian theory which is applicable to the studies intent. In addition it also provides a description of the more specific analytical tools, viz. the Community of Inquiry model which allows for a closer scrutiny of the relevant data in order to answer the research question of this study viz."Does Twitter use assist in the development of critical thinking skills?", and discusses the models conceptual link with the Vygotskian theory.

Vygotsky's Socio Constructivist Theory

This study draws on Vygotsky's work as a theoretical base from which to examine the potential of microblogging in the development of critical thinking skills. From the corpus of Vygotsky's many influential works, his theorizing on the value of social interactions in the formation of higher order thinking skills functions , the role of inner speech in self-regulation and thus voluntary consciousness as well as the notion of zone of proximal development (ZPD) in particular, provides the lens to observe the relationship of the various constructs embedded in the research question.

Noting that critical skills according to Vygotsky are seen as being a collaborative system of several higher mental functions of which are in turn "consciously directed thought processes" (Smolucha & Smolucha, 1986) and reflecting on Vygotsky's concluding remarks in *'Thought and Word'* (1962) i.e. "A word is microcosm of human consciousness" Vygotsky's theory will thus be applied to the analysis of text generated by students on the microblogging platform to investigate whether there is evidence of the formation of consciousness and thus higher mental functions i.e. critical thinking skills.

Implicit in the latter quote above is the notion of the realities of various persons from which consciousness is borne, adumbrated by Shotter (n.d) as he draws attention to Vygotskys conception of the use of ”word meaning” as a “unit of both generalising thought and social exchange”, and thus implying the necessity of recognizing the intrinsic relations and intersubjectivity which gives genuine meaning to words and thus consciousness (Shotter n.d). Bringing this notion closer to our shores, it reflects to an extent the concept of Ubuntu in its rejection of atomistic , individuality and its avowal of immutable interdependent relationships geared towards achieving collective prosperity which, could be argued, is a beneficial trait in cultivating consciousness and thereby the acquisition of higher mental functions (Letseka, 2012). This view however is contested, as was earlier reported in Meintjies and Grosser study (2010) where the Ubuntu philosophy is seen to be an inhibiting factor in the acquisition of critical thinking.

Nonetheless given Vygotsky’s conjectures on higher mental functions as being “mediated processes” and further that they “arise from collective forms of behavior” (Vygotsky, 1962) the relevance of the Vygotskian lens to this study is apparent if we construe the use of social networking applications i.e. the microblogging platform to be a cultural mediating artifact or tool which aids in the formation of higher thinking functions. The rationale for this novel categorization of microblogging as a tool is provided through Vygotsky’s remark “The nature of the tools changes according to the cultural development of society” (Vygotsky, 1962, p. 8).

Indeed for Vygotsky, mediating tools or artifacts are ‘social in origin and use’ and are seen to be used to first ‘communicate with others, to mediate contact with our social worlds” and will thereafter, according to Moll in relation to students using technological devices, be used for “independent intellectual activity: what Vygotsky called higher psychological processes”. Thus to what extent the ability of the microblogging platform as an artifact to mediate the acquisition of knowledge and following this , the acquisition of higher mental functions, is the subject of investigation in this study using the Vygotskian lens.

Further Vygotsky's premise that speech and writing have very different cognitive processes and that written text is in fact a derivative of spoken language, the utilization of microblogging platform as a cultural/mediating tool is investigated to assess its potential as an opportunity for reflection and probing which allows for the dialectical process to unfold and thus aid in transformation of knowledge. This invokes both Vygotsky's sociocultural theory with its emphasis on semiotic mediation i.e. speech as well as his influence on Leontiev's activity theory which in this case can be ascribed to the practical task that students will be engaged in through microblogging and which together employed shield against determinism and assist in molding human functioning (Daniels, 2001).

Having both asynchronous (whereby a user may opt to respond to a tweet /microblog at their leisure resulting in a substantial time lag between responses) and synchronous (real time , immediate responses) communication styles , the janus-faced affordances provided by the microblogging platform lends itself well to a Vygostkian approach on both scores , given the time for reflective responses afforded by its asynchronous use and the generative , rapid conversational thread that embodies a strong 'writing-as–speech' style, reflective of a Vygotskian dialogue (Warnken,n.d).

Utilizing the concept of the Zone of Proximal Development(ZPD) , which is defined by Vygotsky (1978) as the "distance between the actual developmental as determined by independent problem solving and the level of potential development as determined through problem solving under adult guidance or in collaboration with more capable peers" the study aimed to investigate to what extent the potential exists for critical skills or higher order thinking skills, "buds or flowers of development" - referred to by Vygotsky in his seminal work 'Mind and Society' (1978), to maturate in a dynamic and dialectical learning process, afforded by the microblogging platform. A distinguishing feature of this platform, which lends to its potential as a learning medium, is its perceived ability to provide for the use of scaffolding , either by peer feedback or collaborative dialogue thereby invoking the Vygotskian theme of 'more knowledgable others', which is a key ingredient in the social contructivist theory of learning.

The ultimate aim of such a process is thus the internal transformation of the learners cognitive ability.

The ZPD notion also permits us to consider other contextual factors such as social , cultural , political, ideological or economic factors which may impede on a student's ability to develop the required cognitive skills. An appreciation of this impacting milieu guards against cognitive nihilism which serves to perpetrate notions of biological determinism whereby 'cognitive abilities are seen as biological and hereditary in nature and thus unchangeable' (Kincheloe, J 2010) and rather upholds the notion of the significance of the social dimension in the development of consciousness and learning whereby collaboration with others is seen to be a cardinal aspect of learning i.e. the "self is constructed via relationship to others" (Kincheloe,J 2010).

Thus the potential for the use of the microblogging platform , in its offering as a social networking application, to allow for internal learning to be transformed to externalised knowledge, and encompassing the ZPD notion in its affordance of a scaffold for learners whilst enabling the formation of a community of practice (Atwell, 2010) along with its characteristic as a mediating artifact provides a cogent argument for the relevance of the application of a Vygotskian lens .

Analytical Tools

At a closer more interrogative level the study utilises Garrison, Anderson and Archer's(2000) "Community of Inquiry" model which is widely used as a measurement tool for textual analysis of online discussions and hailed as the most 'influential theoretical framework' in higher education online teaching and learning research (Shea, Hayes, Vickers, Gozza-Cohen, Uzuner, Mehta, Valchova, Rangan, 2010). This process oriented, theoretical model serves as both an evaluative model for online as well as a pedagogical construct to inform the practice of online instruction (Swan, 2008). The model is premised on the notion that three presences viz. a social teaching and cognitive presence are integral to the development of a community that can

support meaningful inquiry in an online based environment. A more comprehensive explanation is provided in the Methodology section.

Whilst the conceptual roots of the model appears not to have been made explicit by its authors, drawing criticism regarding its ability to withstand empirical testing (Jézégou 2010) ,a strong argument is nonetheless put forth by the very critics who highlight this theoretical/epistemological weakness, on the model's potential as an effective research tool on elearning, based on its affirmed affiliation with the North American Anglophone transactional perspective of Dewey's pragmatist philosophy which is operationalized through practical inquiry(Shea et al, 2010). Inherent in this process of engagement is the notion of the scientific method by which learned or neophyte members of a community, through transactional engagement, are able to not only 'foster the individual and collective construction of knowledge ,but also of critical thinking.' (Jézégou 2010). It is this emphasis on the social nature of learning whereby an individual /group can construct knowledge through collaboration with others (i.e. transactional engagement or mutual exchanges) along with the concept of self-direction that Garrison et al (2000) describe as a crucial aspect of their COI model, which allows Jézégou (2010) to conclude that there is indeed a valid link with the model to a socio- constructivist theoretical underpinning in addition to its pragmatist foundation.

Furthermore the same authors (Garrison et al 2001)use Vygotsky's assertion that "By being included in the process of behaviour, the psychological tool alters the entire flow and structure of a new instrumental act, just as a technical tool alters the process of a natural adaptation by determining the form of labor operations" to validate the potential impact that text based communication, in this case the microblogging act, has in facilitating the formation of critical thinking .This demonstrates therefore the foundational premise that the Vygotskian theory of the development of higher mental functions lends to networked technology enhanced learning (Ravenscroft, 2010) and thus linksthe Community of Inquiry model's genesis to a socio constructivist theory

It seems then reasonable to assume the validity of this model to evaluate evidence of online learning utilizing a Vygotskian theoretical framework given the above demonstration of key socio constructivist principles that the Community of Inquiry Model integrates into its operations.

Chapter 4: Methodology

Introduction

The purpose of this section of the report is to comment on the research design executed in this study by describing how and from where the data was collected, the ethical considerations and procedures linked to this approach, the subsequent data analysis and the concomitant potential researcher bias and measures applied to minimise this variable. In particular the chapter devotes a substantial part to the discussion around the specific analytical tool, the Community of Inquiry model.

Practical design

The research study focused on a set of tweets or microblogs generated by students in a first year course on 'Introduction to International Relations' which spanned a period of approximately f our months (February - June). In addition the research tool also included a pre-activity questionnaire aimed at ascertaining user names and other details pertaining to demographics and access to technological utilities along with a post-activity survey . The nature of the contents of the latter survey relied essentially on the pre- defined Community of Inquiry Survey, a widely used research instrument, which is included in the Appendix, to ascertain learners perspectives of social, teaching and cognitive presences.

Clearance was obtained from the Human Research Ethics Committee (HREC) at the University of the Witwatersrand. Informed consent was obtained from all participants which included both lecturers and students and approval from the relevant school head was also obtained.

Purposeful sampling strategies

The study utilized a purposive convenience sampling method as it comprised of students who are registered for the International Relations course of which the Twitter activity formed part of the course offering. This sample is also a non-random type given that permission was obtained from participants who were given a choice to voluntarily elect to participate in this study. However students were encouraged to participate on the basis that the microblogging activity,

whilst not being used for assessment purposes, would form part of the course activities and may potentially enhance their learning.

The first year course with 450 registered students consisted of approximately 28 lecture sessions covering 17 topics modules with ten tutorial questions which were addressed in weekly face-to-face sessions. These tutorial were run by senior International Relation students The course was thus delivered primarily in a face to face mode through weekly lectures and tutorials whilst online support entailed the dissemination of course materials via the university learning management system. In addition the class was informed that the use of Twitter, as a microblogging platform, would be employed to extend class discussions. This however, was not enforced as a compulsory activity although the lecturer actively encouraged the use of Twitter during every lecture session. Students were informed of the course hashtag to tag their tweets with (i.e #WitsIR) and a widget profiling the course tweets was also placed on the course's online homepage on the University's learning management system.

Given Owens et al (2009) findings on the challenges that first times users face when using the Twitter interface, bearing in mind though that since the publication of their study there has been major improvements on the Twitter interface, measures were put in place to circumvent possible compromised digital literacies by ensuring that training was offered to students during lunch hours as well as the availability of an online tutorial on Twitter use on the course homepage on the LMS .

The tweets or microblogs were collated using a free open source application called the Twitter Archiving Google Spreadsheet (TAGS) developed by Martin Hawskey (Hawskey,2012), which is available for free use in the Google Template Gallery. This application aggregated the tweets tagged with the course hashtag #WitsIR .The use of hashtags is a convention particular to the Twitter application and initiated by the Twitter users themselves as mentioned earlier, and is essentially a keyword prefixed by a hash(#) symbol,. The software application thus collected all tweets tagged with the hashtag .It is important to note here that the final dataset could

therefore very well have excluded posts that were meant for the course but did not have the relevant tag associated with it as it was possibly sent either directly to the lecturer, tutors or students in the course . This hypothesized occurrence was confirmed by the lecturer who mentioned that though he sought to redirect these tweets back to the stream through retweeting them with the appended hashtag, he could not confirm that all tweets, without the hashtag directed to him, were dealt with in this manner. Moreover there was no way to gauge to what extent this issue may have occurred both with tutors and students where tweets intended for the course were sent to either without the appended hashtag. This issue is dealt with later in the Results section.

At the end of the experimental study period, the dataset was then exported to Excel for further analysis. Thereafter a copy of the datasheet was given to each one of two coders with an attendant coding scheme included (described below) . The coders were thus tasked with analyzing each tweet, which was the accepted unit of analysis, the concept of which is elaborated on later, for this study, using a content or transcript analysis approach . It was agreed that each tweet would be assigned to a particular presence i.e. one of either of the three presences (cognitive , teaching or social) deemed a best fit(discussed below) as well as the appropriate category within the presence selected. Coders familiarized themselves with the various indicators of each category and sought to select the most appropriate category for each tweet. Where necessary, if the tweet was particularly rich in nuances, then a second presence was assigned to the respective post.

The coders were also provided with a list of students' Twitter IDs collated from the data provided in the pre-activity Twitter questionnaire that students were meant to complete before the Twitter activity commenced. A list of Twitter ID's belonging to known tutors and other lecturers were also provided to the coders and it was agreed that the tweets of these users would not be analyzed for the presence of cognitive presence but rather added under social presence or teaching presence.

Once coding was completed, a frequency count was conducted whereby each category in a particular presence was summed up .This essentially entailed adding up the instances where a a particular category was coded for and thus assigning frequencies to explore potential patterns rendering the seemingly ostensible quantitative procedure as in fact a qualitative procedure given its reliance on interpretation. A process of negotiated agreement was then engaged in, in which the two coders met to compare and deliberate on differing interpretations, seeking to reach consensus where possible, so as to ensure a higher level of agreement. Inter-rater reliability checking followed, applying Cohen's Kappa (Cohen, 1960; 1968) and using the tools provided by the Cohen's and Fleiss's Kappa programme, developed by Chang(2012). The significance of this negotiated transcript analysis procedure is discussed in the following section.

According to Rourke, Anderson, Garrison, , & Archer (2001) Cohen's Kappa is defined as a chance-corrected measure of interrater reliability that assumes two raters, *n* cases, and *m* mutually exclusive and exhaustive nominal categories. They describe the formula for calculating kappa as::

$k = (F_o - F_c) / (N - F_c)$

Where: N = the total number of judgements made by each coder

F_o = the number of judgements on which the coders agree

F_c = the number of judgements for which agreement is expected by chance.

Methodology

As previously mentioned above the critical thinking or practical inquiry model proposed by Garrison and Archer (2000) was applied in the analysis of the data in this study .This model describes knowledge construction or critical inquiry developing through the formation of a community of inquiry requiring ,in an online mode , optimal levels of three presences viz. teaching , social and cognitive presence to allow students to negotiate meaning and thereby acquire knowledge .

It is primarily the latter presence alluded to above i.e. cognitive presence which was the focus of this study, and which is described as being a developmental series of four phases viz, the triggering, exploration, integration and resolution phase. These phases together constitute the process of critical inquiry formation. The data was thus analysed within this framework to investigate evidence of cognitive presence and hence critical inquiry or thinking in the learners engagement with content.

Analytical Tool Discussion : Community of Inquiry Model

According to Heckman and Annabi(2005) , the Community of Inquiry model, which is the 'most current integration of past work on critical thinking, constructivist learning, and social interdependence theories' provides an efficient, reliable and valid analytical tool for researchers as well as serving a utilitarian function for teachers to promote higher order thinking. As previously described, it consists of an overlapping triad of cognitive, social and teaching processes, together producing the collaborative Community of Inquiry ,which is, as mentioned above, an integral aspect of the formation of critical thought and thus pertinent to this study given its reliance on a group dynamic i.e. a cohort of first-year students microblogging online. Given this study's focus on the formation of critical thinking skills, the cognitive presence element of the overlapping triad which reflects the formation of higher order thinking skills was thus germane to this study. The focus on the cognitive presence, in particular, to assess deep learning in an online mode has been previously applied to various other studies (Garrison et al. 2001; Garrison et al 2000 ;Chu 2004) . Hence this study applied

the critical thinking (practical inquiry) model , which is essentially a subset of the larger , encompassing Community of Inquiry model , referred to above , which is seen to promote cognitive presence as well as to assess cognitive presence (Garrison 2001).

Cognitive presence

Swan et al(2009) provides a comprehensive exposition on the origin of the cognitive presence of the community inquiry model by tracing it to Dewey's theorizing on reflective inquiry as 'having practical value in providing meaning to experience' based on the provision of a resolution which emanates after engagement in various phases of reflective thought. Thus the practical inquiry model is born which 'operationally defines cognitive presence in the COI framework' (Swan et al 2009) . The authors liken the cognitive presence to a quadrant of experience defined by two axes of which one is the 'action- deliberation' axis , which describes the 'reflection on practice' exploit involving reflection and discourse as it straddles iteratively and unobtrusively across two juxtaposed areas viz. the learners private and reflective world and the community's shared world of discourse. The axis traversing this vertical psycho-social axis is the 'perception-conception' dimension which can be seen as a continuum of the process of information assimilation and meaning construction , embracing both the divergent process of analysis and the convergent process of synthesis,_ from whence insight and understanding occur at the intersection of these divergent perception and convergent conception processes (Swan et al 2009.) Thus the requisite rigorous and iterative process of sustained reflection and discourse in order to ultimately yield a resolution to the initiating problem is described by the idealized sequential interplay of these axes and is illustrated below.

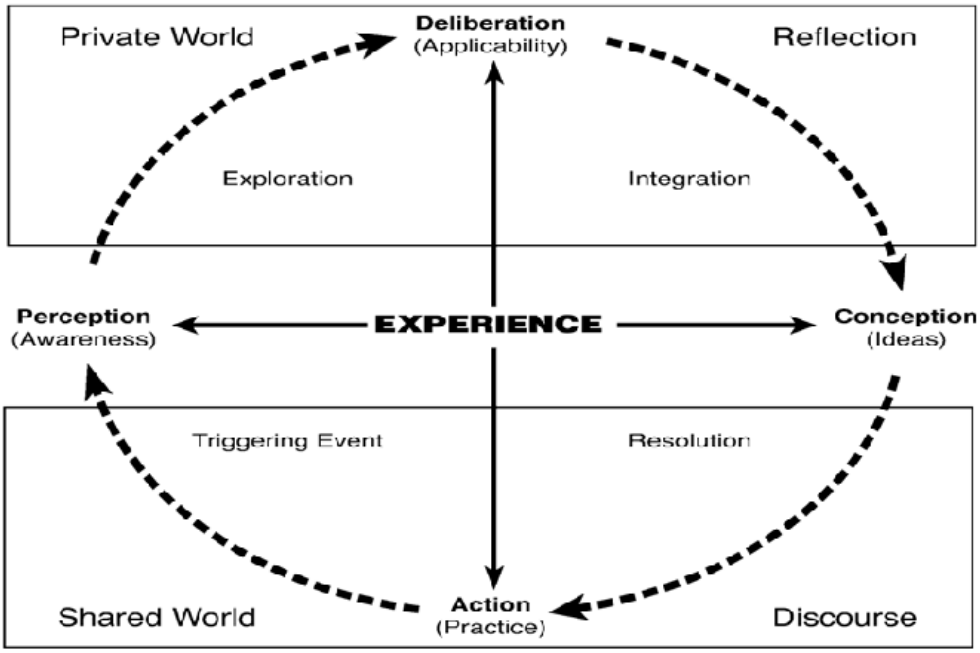

Figure 1: Practical Inquiry Model (Garrison, Anderson & Archer, 2001)

According to the proponents of the model, the first event that sparks the thinking process is seen to be that which causes some sort of disturbance i.e. a state of dissonance or feeling of unease and thus termed the **triggering** event which is situated in the lower left quadrant of the model. Examples of this event provided by Shea et al(2010) are those utterances/thoughts which present a problem or stimulate discussion e.g. questions, presenting background information .

This event is then followed by the **exploration** phase which describes the scavenging hunt that participants engage in as they move iteratively from their private world of reflection to social exploration (Chu,2005) in their search for more information to elucidate or clarify the initiating problem or dilemma. As such this phase represents the beginning of the interplay between the individual and the community in the quest for meaning. In so doing it carves the path for the realisation of Vygotsky's theory of intersubjectivity (shared understanding) and internalisation which is seen as the 'pivotal moment of the development of rational, logical thoughts, advanced thinking and intellectual meaning making' (John-Steiner & Soubermanm,

pg 126 as cited in Warken(n.d)). Indicators for this phase are often comments that can be categorized as information exchanges such as expressing opinions on a previous comment, asking for clarity on a previously raised subject (Sinnapan and Zutshi,2009) or brainstorming. It is evident that the line of thinking that is employed in this phase, as learners apply their thinking to different settings or situations , is characteristic of *divergent thinking* which is described as the ability to be flexible, open-minded and prolific in proffering solutions - traits which according to numerous authors (Meintjes and Grosser, 2010; Belluigi, 2009) are essential ingredients of critical thinking . Guilford (1967) also describes divergent thinking as the essence of creativity while Davey(n.d), by drawing on Lipman's Community of Inquiry process in her study on critical engagement through dialogue, asserts that creativity, along with care, are essential to critical thinking. Hence the exploration phase, which at the surface may ostensibly hold little value in being the conceptual 'container' of embryonic thoughts , given the lower psychological processes at play , represents however a potentially powerful springboard for further and deeper engagement if properly harnessed.

Progression to higher order thinking follows in the third phase, known as the **integration** phase whereby reflection and connecting of ideas occurs, framed by a largely convergent process of conception and synthesis (Swan et al, 2006) as the construction of meaning is attempted. In this phase there is a search for a viable truth, through exploits such as drawing inferences to previously raised issues , evaluating others ideas, augmenting a point previously made , hypothesizing with relevant reason etc. (Darabi.et al, 2011) all of which are geared to promote the acquisition of higher order thinking. Vygotsky's internalisation theory is aptly demonstrated here whereby the evolution of speech or thought from the social or intersubjective, demonstrated in the previous phase, is internalised or appropriated by the individual in this phase , manifesting in considered and more evaluative responses. Garrison et al (2000) however point out that this phase is often the most difficult to detect and requires an active teaching presence to fully extract its potential to stimulate cognitive development.

The last phase is called the **resolution** phase. As its name suggests, it refers to the culmination of the inquiry process through testing and selection of the most viable solution to the initiating question or dilemma(Swan, 2006). Ordinarily this can easily be achieved by testing the proposed solution through a practical application but as Garrison points out in an educational context this is a challenge and hence a reliance on vicarious testing through 'thought experiments and consensus building' is proposed in place of practical applications. Nevertheless ,what is important is that progression to this phase is possible with the right intervention as Swan(2006) asserts that 'if the goal and demand is for resolution, students will achieve this state' which underscores Garrison et al's (2001) contention of the need for 'clear expectations and opportunities to apply newly created knowledge' in order to progress to this phase.

It is important to note that the four phases described 'should not be seen as discrete or linear' a cautionary insight proffered by Swan (2009) taking into account, the models original proponent, Dewey's rejection of dualism, and hence the researcher is exhorted to anticipate conceptual leaps or skipping of phases , introducing thus the concepts of intuition and insight which are the 'bud and flowers' of the critical thinking bouquet (Garrison et al, 2001). According to these authors the cognitive presence is merely defined in this quadratic manner in the interests of parsimony to aid reliable data collation .

Whilst, as previously mentioned, the focus of this study is on the cognitive presence given the subject being critical thinking, Shea et al(2006) recommends examining *all* three presences as opposed to just one component of the Community of Inquiry framework in order to determine the mitigating factors that impact on knowledge construction. They argue that previous research which focused on one component and relied on surveys for the teaching and social presence lacked methodological rigour as the survey sought to capture mere perceptions whilst a content analysis best serves the validation of these presences since it allows for a more direct measurement.

The study thus also looked at the teaching and social presence but did not employ a finely granulated analysis of these presences as the aim of the study was to understand the construction of critical thinking and thus focus on the cognitive presence with the significance of the other two presences being only in relation to how they correlate with or impact on the emergence of the cognitive presence. Hence a description of these two presences is provided in order to understand their impact on the emergence of higher order thinking.

Teaching presence

The second of the lenses in the community of Inquiry model, the teaching presence is a critical component referred to by Anderson et al (2001) as the 'design ,facilitation and direction of cognitive and social processes for the realization of personally meaningful and educationally worthwhile learning outcomes' and without which, as Garrison(2000) contends, interactions between participants in a forum are insufficient to 'ensure effective online learning'(Swan et al,2008). Indeed caution is issued on the likelihood of 'serial monologues' being generated by students in the absence of explicit guidance (Tuckman et al cited in Garrison 2000) whilst elsewhere the need for explicit strategies or techniques to help promote higher level collaborative processes is emphasized(Murphy et al cited in Garrison 2000) to stem failing educational activities utilizing computer conferencing activities due to insufficient teaching presence and lack of appropriate leadership. Hence the imperative for an active instructor presence is supported by several authors as cited in Garrison et al (2000) who attest to the significance of the teaching presence's influence in relation to student satisfaction, perceived learning and community sense.

Debate rages on as to the composition of the teaching presence in so far as the number of categories that constitute this presence (Garrison 2000, Shea et al 2006, Swan 2008)).This issue regarding the reduction of the categories (more specifically the combination of two categories into one viz. facilitation and direct instruction as 'directed facilitation') however is more relevant to the survey instrument that students are required to fill in to assess their perception of the various presences and was argued for on the basis that students may not be cognisant of

the pedagogical principals distinguishing facilitation from direct instruction which embody the principles of dialogue and critical discourse respectively (Garrison 2000).

In terms of coding for the teaching presence however , which is discussed in greater detail below, *all* of Andersons et al(2002)'s original three categories were used in this study viz. instructional design , facilitating discourse and direct instruction as it was deemed necessary to understand which aspect of the teaching presence could be enhanced.

Social Presence

The presence most deserving of the epithet 'first lens' given that the term 'social presence' was coined way back in 1976 by Short, William and Christie (in Swan et al,2008) to describe the varied capacities of different media in 'transmitting non-verbal and vocal cues' and thus 'communicating the affective and emotional(the social) aspects of learning interactions', in other words the degree of salience which describes the quality or state of 'being there'(Dunlap and Lowenthal, 2009) in telecommunication media , the social presence has enjoyed the longest research from the three presences in the Community of Inquiry model(Swan et al, 2009). Various studies attest to its relationship with student satisfaction, the development of community of learners and perceived learning (Dunlop and Lowenthal, 2009). It is defined in terms of three elements that serve to project the learners as 'real people'(Shea et al, 2009) viz. *affective expression* described by statements that induce a positive climate of learning through learners expressing 'emotion, feelings, belief and values'(Swan et al,2008) which according to Garrison et al(1999) are 'inseparably linked to task motivation and persistence , and therefore, to critical inquiry'; *open communication* relating to risk-free expressions described by 'reciprocal and respectful exchanges'(Garrison et al, 1999) that serve also to nurture the final element being *group cohesion* described as articulating those expressions that encourage group collaboration(Garrison et al, 2006) , an essential aspect that supports and facilitates the quality of discourse and thus the promotion of critical inquiry. .

Shea & Bidjerano (2009) reports on various studies which reflect the mediating aspects of the social presence on instructor teaching presence resulting in higher level of cognitive thinking

i.e. social presence mediates cognitive presence development. Furthermore they recommend, as mentioned previously on the inclusion of all three presences in investigating the effectiveness of the community of inquiry given the interplay and the correlates of the social presence to significant learning i.e. cognitive presence through mediating teaching presence. An examination of all three presences in this study is thus warranted to investigate its effect on the development of critical thinking.

Unit of Analysis

Integral to the content or transcript analysis approach, which is a qualitative methodology , is the process of coding that entails a defined unit of analysis, described as the identified segments of transcript that will be analysed This process of 'unitizing' is necessary to ensure reliability especially when multiple coders need to seek evidence of the particular construct under investigation, which for example in this study refers to evidence of critical thinking, within a selected ,easily identified and consistent segment of transcript(Rourke et al, 1990). In addition to reliability, Rourke et al (1990) point out that meaningfulness, productivity and efficiency must be also considered when identifying the unit of analysis ,especially in a quantitative content analysis study in order to render valid results. It is to this end that the microblog is identified as the unit of analysis or message unit on the basis of the following advantages it affords, (1990) viz. it is "objectively identifiable" i.e. the coders can easily agree on the number of the microblogs in the cohort to be studied thus guaranteeing consistency ; "produces a manageable set of cases", "exhaustively and exclusively" contains the construct under investigation i.e. the microblog, tweet or status update is viewed as containing a single thought or idea allowing for it to be coded by the presence of identified indicators; and most importantly "is a unit whose parameters are determined by the author" (Rourke et al, 1990).

The latter point is particular significant to this study as it addresses specifically one of the research questions which seeks to understand whether the brevity of the tweet constrains meaningful input. To this end a count was conducted on the number characters within each tweet , and given that a tweet, and *not a unit of meaning* was identified as a unit of analysis and

thus accepted as containing a single thought (compare Henri (1992) and Jeong (2003) whereby the unit of meaning employed in their studies, consisted of sentences or phrase that contain a single thoughts and was identified as the unit of analysis based on the need to ensure that the thematic unit or a sensible thought is captured) the count was thus able to determine how often , if at all , students ever exceeded the 140 character limit to convey their thoughts and whether the limit on character input contributed to the formation of a nonsensical statement/s.

Thus a mixed method approach was adopted which used both quantitative and qualitative methods with the latter serving to illuminate the quantitative data mined from the microblogs through the particular manner of coding and summing the frequencies of indicators which is described below.

Categories /Indicators

The theoretical framework of the Community of Inquiry(CoI) , which has already been discussed above is judged to have good validity given the extensive body of research dedicated to its application in online communication research(Garrison et al, 2001; Shea, P., & Bidjerano, T, 2009; Shea et al, 2010) . However the models proponents point out the need to refine its categories or indicators required for the coding scheme, to ensure further validity. This necessitates thus the development of appropriate descriptors or indicators and examples of the four phases identified above which describe the genesis of cognitive presence, along with categories depicting the teaching and social presence . Garrison et al (2001) provides apt examples of such indicators and descriptors in addition to other researchers investigating similar questions regarding cognitive presence in online environments having utilized a combination of text analysis models when applying the Community of Inquiry model or practical inquiry method (Poscente K(2002) , Heckman and Annabi (2005) Corbett et al (2008)).

After an extensive scouring of these taxonomies it was found that Shea's et al(2010) modified coding scheme ,derived from a revision of various indicators from a host of studies (Rourke and Anderson ,2004; Rourke et al. 2006;) and informed by previous research (Shea et al,

2006)which highlighted the failure of certain indicators to serve as sound 'interpretable factors', was the most suitable coding scheme for the purposes of this study. This was further validated by its inherent simplicity and clarity hence echoing Garrisons' recommendation to adopt parsimony with discrete categories that can be applied effectively and efficiently reducing inconsistency (Garrison,2006). A description of the codes and indicators which were primarily used from Shea's study(2009) as well as that from Sinnappan and Zutshi's (2011), is provided below and are subdivided in three tables under the various presences they refer to.

Table 1 Cognitive Presence Categories and Indicators

Categories	Definition	Indicators
Triggering event (CPTE)	Evocative stage whereby evidence of the following engagements are witnessed : Stimulation of one' curiosity Introduction of core organising concept or problem Framing the issue and eliciting questions or problems	New topic introduced, Sense of puzzlement , Asks for comment
Exploration (CPEE)	• Here a recognition of the nature of the problem or issue is evident and is accompanied by various acts characteristic of divergent thinking i.e. searching for relevant information and possible explanation • brainstorming	Information exchange , Comments on previously raised resource, expresses an opinion on a previous tweet, expression of opinion with no linked resource
Integration (CPIE)	The discussion in this phase is more focused and structured whereby the following is witnessed: • Possible tentative integration of ideas • Probing of misconceptions and understanding	Connecting ideas eg; Draws connections from multiple tweets, multiple @s AND multiple URLs, multiple hashtags and multiple URLS

Resolution (CPR)	The last phase which is described by evidence of a contextually specific solution or resolution of the presenting dilemma or problem. Discussion brought to a close Resolves an issue, brings a discussion to a close, uses ideas from learning material to settle an argument	Discussion brought to a close. Argument settled. Apply new ideas

Table 2 Teaching Presence Categories and Indicators

Categories	Definition	Indicators
Design and organization (DE)	Communication on the units, methods, important course outcomes etc. Typically staff-staff communication Providing clear instructions on how to participate in course learning activities, e.g. clear explanation of how to complete course assignments successfully Providing advice on technical issues	Setting curriculum and communicating assessment methods to be used in the course Designing methods Establishing time parameters Establishing netiquette
Facilitating discourse (TFD)	Typically a retweet or reply with external resources, soliciting clarification, asking for explanations	Sharing personal meaning Identifying areas of agreement/disagreement Seeking to reach consensus Encouraging, acknowledging or reinforcing student contributions
Direct instruction (TDI)	Providing guidelines on topic and/or format of discussion. Links to external resources. Question prompts on subject matter	Focusing discussion Provides guidelines on topic and/or format of discussion Supplying clarifying information Making explicit reference to outside material

Table 3 Social Presence Categories and Indicators

Categories	Definition/Examples	Indicators
Affective Expression (A)	Emoticons, text-based expressions of humour e.g. LOL, LMAO, emotionally loaded words like ridiculous, includes emotionally laden value judgements e.g fantastic, brilliant	Expressing emotions Use of Humor Self Disclosure Use of unconventional expressions to express emotion Expressing value
Open Communication (OC)	Replying to another tweet not necessarily about course content or adding to another tweet. Bold statements, controversial statements (indicates a level of comfort making them), personal confessions or specific advice to classmates.	Continuing a thread Quoting from others' messages or referring explicitly to others messages. Asking questions Complimenting, expressing appreciation. Expressing agreement/disagreement. Personal advice
Group Cohesion (GC)	Replies with an opinion, or asks for clarification, e.g. RT with agreement, RT with disagreement, @mention, multiple @mentions, reply with URL	Encouraging collaboration Use of inclusive pronouns Salutations, phatics Sharing information unrelated to course Course reflection

Reliability: Negotiated Coding

Ensuring that data findings is consistent is especially relevant in this research study given the reliance on a negotiated coding approach which is advocated by Garrison et al (2006) as lending to increased rigour in coding the transcript or tweets (unit of analysis). Thus, as mentioned previously the two coders (the researcher and the research assistant) were tasked with individually coding each tweet according to the relevant categories as stipulated in the coding scheme provided by Shea et al (2010) and thereafter engaging in a joint discussion to reach

consensus on differing codes where possible. This process of negotiated coding is an especially important aspect in ensuring reliability of data as it extends the measure of each coders interpretation of text into a realm of intersubjectivity through the opportunity of frank and open discussion , a necessary procedure given the double hermeneutics at play which defined by Giddens in Garrison et al (2006)'as the subjective interpretation of expressed responses relating to concrete experience in the physical world', in other words, alluding to the presence of both manifest and latent content of the transcripts.

Manifest content is described as the observable surface meaning and as such poses little interpretative burden as it lends itself to being easily coded for and thus mechanistically counted (Rourke et al,2010). Latent content on the other hand, which is germane to this study which focusses on higher order thinking skills and thus in-depth processing , refers thus to the meaning that is embedded within text or communication i.e. the nuances or hidden meanings. It is further broken down by Rourke et al (2010) as comprising of two types i.e. latent pattern variables and latent projective variables. The former refers to indicators of broader categories or target variables which allow for coding of the relevant categories but only once an established pattern or other defined characteristics are present at the same time, demanding therefore a somewhat more sophisticated coding scheme than that for the manifest types, with both focusing on the meaning of the message as lying in the text. Contrast this though with the latent projective variable in which the interpretation of text is influenced by the social or cognitive scheme of the interpreters or coders imposing thus a considerable interpretative burden when analyzing content with the concomitant obvious impact on compromised objectivity and reliability of data.

Thus the test to ensure interrater reliability which is defined as the "extent to which different coders, each coding the same content, come to the same coding decision" was employed utilizing the Cohen's kappa (k) statistic referred to previously. Chang's(2012) online programme generated a Cohen's Co-efficient Reliability of 0.911 which, according to Capozzoli, McSweeney and Sinha (1999) in Rourke et al (2000) attests to a score of excellent

agreement beyond chance. It is worth noting Krippendorf's words, that 'reliability often gets in the way of validity' (1980) alluding to the measures that are sometimes taken to increase reliability, of which the researcher is aware may have been present in this study due to the power set up of the seniority of the main researcher and the intern second coder who may have been unduly influenced by the researchers opinion in the negotiating process.

Chapter 5: Results

Introduction

This section presents the findings that emerged from this study. As such it reports on the data that was collected and collated both from the pre-activity survey, which was made available online to students through the learning management system as well as from the Twitter microblogs. Given the poor response to the post activity survey , the insufficient data that was collected through this tool could not be used as significant findings of this study.

Quantitative data regarding participation and length of tweets from the Twitter data were collated using the online Twitter analytical tool reported on below and the results were thereafter tabulated for easy referral.
In addition the microblogs or postings were then analysed utilising transcript textual analysis through the process of coding , as described in the previous chapter.

Participation Data

Survey results

Of the 450 students registered only 90 students answered the pre-Twitter activity questionnaire which was distributed online through the university's learning management system. Of these students, 78 indicated that they would be willing to participate, while 9 refused to do so. 3 of those refusals were on the basis of the following cited reasons :

- *'I have no idea how twitter works'*
- *'i do not have a twitter account, i stay at home where I do not have internet access'*
- *i dont like using twitter'.*

Of the rest of the students who continued with the questionnaire, it emerged that 70% were in the age 18 - 20 brackets with 3% being over 24, 60 % were male and 74% were first time Twitter users. In addition 57% indicated that they had attended a public school whilst 96% owned a cell phone of which 57% was purchased on a prepaid basis.

Unfortunately the post- activity survey was only completed by 32 students from a class total of 450 constituting 7 % despite numerous reminders to students to complete this activity. Due to its inadequately small size , the results from this survey could therefore not be used since its provided no statistical significance .

Twitter Participation Data

The table below illustrates the information culled from the Twitter data aggregated via the Twitter Archiving Google Spreadsheet (TAGS) developed by Martin Hawskey (2012).

Table 4: Summary of Twitter Data

	Number	%
Total Tweeters i.e. participants who posted to hashtag #WitsIR	234	
First year students who elected to participate according to the pre-activity survey	77	
First year tweeters i.e. identified first year students who actually participated in the Twitter activity	69	
First year tweeters as % of total tweeters		29%
Total no. of students in class	450	
First year tweeters as a % of class total		15%
Total no. of tweets	1510	
Number of tweets with links	407	26%
Number of Retweets	468	30%
First year tweets and as a % of total tweets	566	37%
Average no. of tweets for first years	8.2	
First Year tweets in cognitive presence as % of total cognitive presence tweets 194/329		59%
count of total tweets <140 characters	1433	
count of total tweets>140	77	5%
No. of tweets with Links	407	26%

The study generated a total of 1510 tweets during the four month study term.

As shown in Table 4, of these 1510 tweets approximately 566 tweets (i.e. about 37 %) were from the first year class with the rest of the tweets generated by either the lecturers or tutors , external folk or other International Relations (IR) students in higher years of study (2nd and 3rd year IR students) who participated in the hash tag activity. The tweets by first year students were identified by correlating their user names (Twitter ID) with that of those given in the pre-activity questionnaire(n=77). Of the 450 students enrolled in the first year International Relations course, 69 students participated in the activity accounting for approximately 15% of the class . Of the total number of tweeters (n=234) i.e. participants who posted with the hashtag #WITSIR, the first year number constituted 29%.

On analysis of the content of the tweets, it was evident that some tweets , which were ostensibly non first- years as their Twitter ID's did not appear on the list alluded to above , were indeed posted *by* first year students as their postings referred to issues pertinent to the first year curriculum or class activities. It is likely that these students did not complete the pre-activity questionnaire but chose to participate in the activity anyway. Where this was the case, their Twitter ID's were confirmed with the lecturer, based on his recollection of student names who had contacted him over and above the hashtag activity (i.e. through directly messaging the lecturer and enquiring about issues with regards to the first year curriculum, often without the required hash tag associated with it) and to which he could attest to the Twitter ID's in question as indeed belonging to those of first year students. However, not all the suspected cases could be confirmed as there appeared to be no absolute method to unequivocally account for individuals who might have posted to the hashtag or Twitter feed *without* participating in the pre- activity survey. Thus the given number of tweets generated by first years for this activity should be viewed as a conservative figure taking into account possible additional first year tweets which cannot be accounted for. In addition, upon consultation with the lecturer, and as alluded to earlier, there were tweets associated with the course but which did not have the relevant hashtag associated with it and which were thus missed in the data

collation exercise. Hence the first year student participation as well as the number of tweets should both be viewed as a conservative estimate given the possibility of lost tweets and users.

Community of Inquiry Framework

The tweets were then analyzed and categorized according to Garrison, Anderson and Archers' Community of Inquiry framework(2000) as outlined above. The coding scheme was adapted to include an extra column /category for each of the presences which would accommodate for tweets that satisfied the criterion for either of the presences but which were not posted by course participants. The table below illustrates the coding results for each of the presences, with their associated categories across the four month period.

Table 5 : Results of coded tweets across the three presences

Cognitive Presence				Teaching Presence			Social Presence			CP0	TP0	SP0
CP-TE Triggering New Topic Sense of puzzlement	**CP-EE Exploratory** Information exchange: comments on previously raised resource, expresses opinion on previous tweet, with no linked resource.	**CP-IE Integration** Connecting Ideas: Draws connections from multiple tweets. Use of @, urls, #	**CP-R Resolution** Apply new ideas, resolve an issue, bring discussion to close.	**TP-DO Design & Org**, setting curriculum & methods: typically staff : staff interactions	**TP-FD Facilitating Discourse** esp RT or reply with external resources, solicit clarification, asking for explanation	**TP-DI Direct Instruction** Focussing Discussion, provide guidelines on topic &/or frmt	**SP-A Affective** Expressing emotions, humour, Use of emoticons, Emotionally laden words, Phatic statements loaded words, and laden value judgements	**SP-OC Open Communication** Risk free expression, bold, controversial statements, personal confessions	**SP-GC Group Cohesion** encouraging collaboration, replies with opinion or asks for clarification , RT with dis/agreemnt			
266	55	7	1	81	174	211	242	127	255	15	19	57
81%	17%	2%	0%	17%	37%	45%	39%	20%	41%			
329				466			624			91		
22%				31%			41%			6%		

Chapter 6 : Analysis and Discussion

Introduction

This chapter is dedicated to the interpretation of the data providing in the preceding chapter. Here I ruminate on potential causes of the participation data while also addressing the research question on access to technologies and the significance of the limited character input on cognitive abilities. In addition I also discuss the issue of interactivity that the microblogging application affords. Thereafter I provide a brief overview of the development of the three presences i.e. cognitive, teaching and social over time.

Employing a qualitative research method in conjunction with the ostensible quantitative method referred to and discussed previously in the manner of coding and summing the frequencies of indicators I then engage in an intensive analysis of the Twitter posts revealing nuances which assist in validating the reported frequency data and contributes to drawing links between the provides between the concrete data and the abstract concepts.

Participation

Regarding participation, it must be mentioned that in light of the Twitter activity being a voluntary exercise whereby there was no compulsion on students to participate, the mere involvement of those students who utilized this opportunity to engage online and moreover their significant participation implies an element of intrinsic motivation, inherent in this cohort, which is key to deep learning. Welier (2004) in her study on information seeking behavior of Generation Y students i.e. those born between 1980 and 1994 examines the various motivational theories at play in information science research, premised on the notion that information seeking is based on a 'need' and reports that intrinsic motivation refers to self-generated rewards such as the 'satisfaction of curiosity or simply interest in a given topic' with

satisfaction and feelings of accomplishments or control as the eventual embedded rewards and which are, interestingly, more effective than extrinsic rewards, an example of which could be an evaluated task or an incentive. McCelland's 'Theory of Achievement' is also cited (Welier, 2004) which describe three needs viz. the need for achievement, for affiliation and for power , of which one of these is usually dominant and becomes the primary motivator behind information seeking behavior. Weiler(2004) then alludes to the Glasser's Control theory which in the institutional learning context can be described by a student only responding if the desired behavior resonates with or is relevant to their 'basic human needs' and will thus reject activities deemed as 'busy work '.

Reflecting on the above, I thus surmise that it was possibly the interplay of these motivational components, described above, that accounted for the selective participation. The theoretical descriptions proffered clearly echo the scenario of this study since the Twitter activity, whilst not espoused as a course requirement and thus offering no tangible incentive for the student's participation , could very well have been perceived as an information seeking activity given its introduction to students as an 'educational resource'. This is in addition to the students awareness of the lecturer's presence on the online activity lending to their possible perception of acquiring information from an authority. For indeed as Weiler's (2004) focus group study reveals, students preferred to seek 'sources of truth (i.e. 'Good Authorities') rather than information per se', preferring 'human beings as frequently cited sources of information, both people they knew and strangers as well' . This is also consistent with the first principle stipulated by Chickering and Gamsons' 'best practices' framework exhorting lecturers to 'Encourage contact between students and faculty' in order to realize enhanced learning as it is held that student engagement , particularly with faculty members in and outside of class, through formal and informal dialogue , has a positive influence on learning (Chickering et al, 1987). The participation of students could thus be attributed to the lecturers presence online, consistent with Dunlap and Lowenthal's study (2009) .

However it must be borne in mind that the intrinsic motivation could very well also be attributed to the sheer enjoyment of utilising technologies as well as due to the social influence of peers, factors confirmed in a number of studies cited in both Haung and Yoo (2010)and Saeed and Sinnappan(2011).

Whilst it is beyond the scope of this study to investigate the genesis of the motivation behind the cohort of students participation, it is important to highlight the significance of students motivational attitudes in the realm of higher order thinking as there are many studies that attest to the correlation between critical thinking and motivational dispositions such as goal orientations, self-efficacy beliefs, inquisitiveness, flexibility , understanding of opinions of others , fair mindedness and effort. These characteristics are seen as being essential to the employment of critical thinking and thus germane to this study in its investigation of the development of higher order thinking processes through a community of inquiry , which is both operationalized and through which this study is analysed, and further which , "can only emerge if there is sufficient motivation on the part of learners" (Jezegou, 200). Clearly there is evidence in this study of an emerging community of inquiry through the active participation of learners and attribution for this can certainly be ascribed to an inherent motivation on the part of learners.

It is also worth mentioning that whilst only 15% of the class chose to participate in this microblogging activity, as shown in Table 4, the discussion forum tool which was also available on the learning management system that hosted the course content , was hardly, if at all, utilised by the students in the course indicating the learners preference for the online social networking application as the medium of choice rather than the discussion tool on the traditional learning management system. This finding correlates with that of Dunlap and Lowenthal's (2009) study which highlights the compromised value of the learning management system's tools in relation to online microblogging applications in that participation on the discussion forum is constrained by the availability of when the student and faculty member can log-on , resulting often in forced communication that is 'out of context of day- today , hour- to-

hour and minute to minute experience'(Dunlap and Lowenthal,2009). In addition the requisite informal tone that is relevant to the cultivation of a social presence is often found wanting on the discussion forum and thus communication on these forums do not seem to enhance social presence as much as synchronous social networking applications. This issue is discussed later under the social presence topic.

Access to technologies

With reference to Table 4, access was clearly not an issue as a barrier to online participation on the microblogging platform given that 97% of the class students who had participated in the survey had cellphones. While it was not determined whether these phones were smartphones, 42% of the class(see Table 4) had registered on the Universities mobile wireless access thus indicating that their phones had Internet connectivity and were in all likelihood smartphones . Nonetheless given that Twitter was designed to be accessible from even the most simplest of feature phones, it can thus be assumed that participants could readily access the Twitter platform. Moreover the placement of the Twitter widget on the course homepage ensured that students could also view the stream whilst on the learning management system and participate by logging on via their PC's if needs be.

Unfortunately given the poor participation on the post-activity questionnaire in which I sought to ascertain user perception of Twitter use etc. , I cannot conclusively confirm digital literacy access, defined as , in the context of this study, the ability of the student to engage on the microblogging application. However in light of the online presence of majority of students who elected to participate in this activity, i.e. 69 students from a cohort of 77 (see Table 4), and their successful attempt at posting at least one tweet with more than 79% of first year tweeters posting more than one tweet, it seems reasonable to assume that users were somewhat proficient in Twitter use judging by their significant activity and their employ of typical Twitter syntax script e.g. hyperlinks , addressivity and use of hashtags .

Limited character input

Referring to Table 4 again, of the total 1510 tweets , only 5% of the tweet character number extended beyond the 140 limit. This proves then that students did not appear to be hampered by the limit of the character number as their tweets captured comprehensible posts and embodied the requisite unit of analysis, presenting therefore a lucid, coherent post. This finding is consistent with Sinnapan and Zutshi's (2011) study along with numerous other studies which attest to the advantages of the microblogs structural parameters, described by the 140 character input, as allowing for 'quick reflections'(Ebner and Schiefner 2008 in Elavsky), concise writing (Dunlap and Lowenthal, 2009) and focused thinking to reflect purposefully on students experiences (Wright 2010). An analysis of the cognitive quality of the tweets is provided in the discussion section that follows.

Interaction

A closer analysis of the tweet reveals a considerable degree of interactive participation between the first years(majority of the tweets), indicated by the @ sign preceding tweets or within a tweet signifying 'addressivity' which directs a tweet to a specific follower , a phenomena supported by Honeycutt and Hering's(2009)study on the prevalent use of the @ symbol in Twitter. The same authors suggest that it is somewhat remarkable how often these brief, dyadic interchanges occur and how 'surprisingly coherent' they indeed are despite the potentially hindering effect of a 'noisy environment and an interface that is not especially conducive to conversational use' given Twitter's initial raison d'etre to prompt users by its status update question i.e. "What are you doing?" (Honeycutt and Herring 2009), which had subsequently evolved to "What 's happening?", the modified prompt ascribed to Twitters change of focus to a news gathering and information network application in late 2009 (Nutall,2009) and which has now evidently been dropped completely from the interface signifying perhaps its agnostic attraction. Nevertheless Twitter's collaborative appeal is borne out through the extensive, extended conversations witnessed both in this corpus of tweets as

well as in various other studies (Honeycutt and Herring, 2009: Demirbas et al, 2010; Grossek et al, 2008).

And it is these conversations, described as synergistic interactions which is a 'strong indicator of peer-to peer learning and support', and thus a nurturing element for deeper learning since it potentiates the emergence of the community of knowledge building (Song and Chan, 2009). Drawing on Jeong's (2003) study on the sequential analysis of online threaded discussions to examine critical thinking, the significance of the majority of tweets in this study containing the @ symbol and thus signifying the set-up of a two-event sequences or interaction (the realization of which can only be confirmed by the response tweet to the initiating or positioning tweet) confirms a fertile dialogic space which is necessary for the emergence of critical thinking. For , as Jeong (2003) states: 'Meaning and critical thinking is produced by the relation between one utterance and another and is affected, renegotiated, and reconstructed as a result of conflict in social interactions. This conflict energizes and drives inquiry, reflection, and articulation of individual viewpoints and underlying assumptions."

An example of this type of dialogic interaction between two students is provided below (Twitter ID names have been changed to protect anonymity :

Student A : @Student B then Maybe we should start creating opportunities for academics, so that we can take that interest with what we have #WitsIR

Student B :@Student A What opportunities do you have in mind? #WitsIR #Academics

Student A: @Student B we have the intellectuals leaving to EU, easy way is to create infrastructure, and incentives. #WitsIR

Student B :@ Student A For sure. And what sort of incentives would you be interested in? And who should provide them? #WitsIR #Academics

Student A @ Student B allow guaranteed entrances into professions that was studied, bursaries, and a protectionism economy #WitsIR

It is unclear as to what Student A is responding to as the preceding tweet failed to appear in the Twitter stream ostensibly because the relevant hashtag was omitted for the tweet but one can presume that the initiating tweet by Student B was probably that of a position statement, which solicited a response from Student A i.e. the first tweet listed here. There is evidence of agreement to i.e. the 'For sure' statement which concurs with Joengs(2003) study that often responses to position statements are rarely disagreement statements, but which occur generally after further exchanges are engaged in. This finding is consistent with that of Gunwardena, Lowe and Anderson's model on critical thinking(Jeong 2003) which describes the sequence occurring in critical engagement as transitioning from a position statement to agreement, agreement to arguments, and position statement to argument. Inquiry, responding to questions, and clarification are also witnessed in the conversation above and as such illustrates the energising drive brought upon by the conflict of alternative conceptions resulting in 'dialogic reasoning'(Jeong 2003).

I wish to point out that though this study applied the Community of Inquiry model to analyse the presence of critical thinking (which is dealt with extensively later) mention of the Gunwardena, Lowe and Anderson 's model on critical thinking is purposively made, as it relates to the Bakhtin theory of dialogism, which can be seen to be an extension of the Vygotskian dialogical consciousness theory (although many authors challenge the proposed similarities between the two theorists in their cultural-historical approach(Matusov 2010 , Cheyne and Tarulli,2005). An analysis of this argument though is beyond the scope of this study. Nevertheless it is the Bakhtinian focus on utterances and addressivity which is pertinent to this aspect of the study given how the issue of dialogue , in its embracing of various voices through employing participatory principles and resulting in a chiasmic intertwining between the world and the speaker in the shaping of knowledge creation(Shotter 2008), is supported through the modality of the Twitter tool in its employ of the @ sign, also known as the arroba or 'at' sign. This sign serves to solicit a response as well as to construct the utterance , and in so doing provides a platform for constructive and participatory dialogue from the subscribers to a particular feed which is demarcated by the relevant hash tag. .

It is also interesting to note the rapid exchange witnessed on the Twitter stream, attested by the absence of a time lag between responses. This reflects the affordance of the Twitter application to enable a timeous response thus generating a flow of almost instantaneous conversational talk. This issue is elaborated on later under the discussion on the social presence.

Brief Overview of Presences

The preponderance of tweets in the social presence , reflect a finding that is consistent with many studies investigating the formation of a community of inquiry in computer mediated discussions. The progression of the three presences for the duration of the course is depicted below in the following chart .

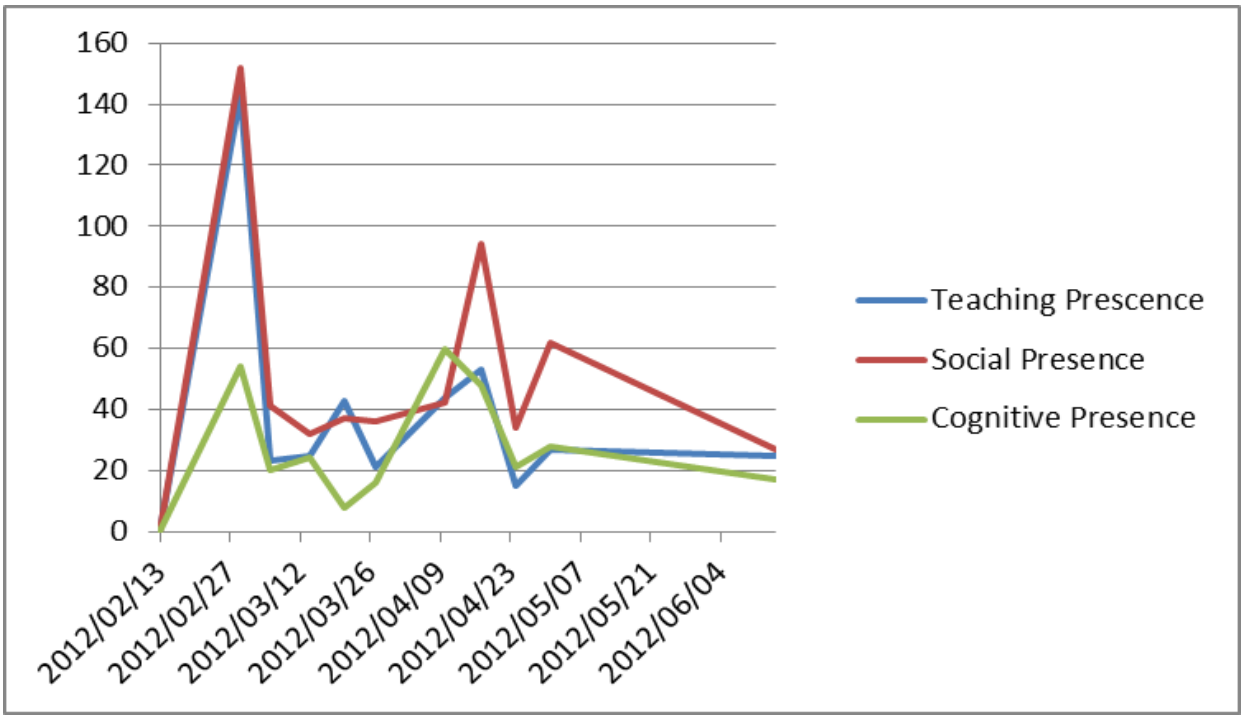

Figure 2: Progression of Presences

According to Shea et al(2010) cognitive presence especially at the higher stages is aided by a robust teaching presence which in turn is mediated by social presence. The above graph depicts this hypotheses to an extent: there seems to a definite correlation with the teaching presence and the social presence in the beginning of the course with a corresponding pattern of fluctuation, albeit of a lower degree, of the cognitive presence . However the teaching

presence is thereafter more closely associated with the cognitive presence, as similar progressions and declines are witnessed especially in the second month of the course whilst a general decline of all three presences persist for the subsequent weeks of the course with the social presence consistently elevated, in relation to the other two presences for the duration of the course. There however seems to be corresponding peaks and troughs throughout the course suggesting the interdependency of the three presences.

An examination of each of the presences follows to allow for a deeper understanding of the constitution of these presences and how their interplay affects critical thinking.

Cognitive Presence

As noted by Garrison et al(2000) , the cognitive presence in an online medium is the key focus domain of most research studies investigating higher order thinking skills and by extension critical thinking. Given this study's focus on critical thinking skills , an in-depth analysis of this domain was thus necessitated to ensure that a meaningful assessment of how higher knowledge is acquired, is achieved. Thus in addition to the reporting of the coded results, which describe a qualitative approach despite its ostensible quantitative nature (Garrison et al ,2006) a more granular analysis of selected tweets in the cognitive presence, along with the other presences' categories was engaged in order to gauge the quality of the presences and so to illuminate the intricacies of the critical thinking process. The rationale behind this approach is that it could serve to possibly suggest or discover potential for enhanced teaching practice, which as Garrison et al (2000) point out is integral to 'moving the process to more advanced stages of critical thinking and cognitive development.' Indeed the cognitive presence which is operationalized through its adoption of the practical inquiry model (Garrison et al, 2001) and described by the four phases of understanding, of which collaboration and reflection through participation in a community of inquiry is essential, lends itself to being applied as a teaching design tool whilst simultaneously functioning as an assessment or investigative tool hence Garrison et al's (2001)alliterative handle for it i.e. 'product and process' tool , as it also provides ample opportunities for intervention if adequately analyzed and utilized.

Whilst the coding results for the cognitive presence area in relation to the other two presences suggest that it accounts for the lowest total number of tweets i.e. 22% (see Table 5), it is interesting to note though that the first year tweets in comparison, yield a substantially larger figure in relation to the total number of tweets i.e. there is a marked preponderance of the cognitive presence in the first year tweets in relation to the rest of the tweets for this study. Given that the first year tweeters account for only 29% of the total tweeter cohort for this study, as indicated in Table 4, their contribution to the cognitive presence which amounts to 59% of the total cognitive presence tweets (see Table 4), suggests that first years who participated in the Twitter activity tended to exploit this task more readily for purposes of knowledge acquisition than other participants as their tweets account for about two thirds of the total tweets in this domain. I surmise that this could be attributed to the fact that first year students were consciously aware of the research study's intent on the focus on critical thinking given that this information was tweeted by the lecturer at the outset of the activity as well as the research instruments that were made privy to students i.e. consent form and information letter handed to students at the beginning of this study ,thus suggesting that they could have possibly been influenced more than the other participants who also engaged in the event, to focus and apply their thoughts in a more cognitive fashion. Thus the possible self-reported data is a consideration which might have contributed to the generation of common method bias in this study , similar to that evinced in Saeed and Sinnapan's study(2011).

That said though, in relation to the total number of tweets generated by the first years, the cognitive presence in the first year tweet dataset did not outweigh the social presence , the latter which accounted for approximately 41% of the first year tweets. This finding is consistent with numerous other studies as cited in Sinnappan, S. & Zutshi, S. (2011) which highlight the non-factual , social aspects of Twitter use. A more detailed discussion of the social presence implied by these exchanges, is provided later especially in terms of its impact on overall knowledge acquisition

Table 6: Cognitive Presence Data

FY Tweets	Cognitive Presence			
	CP-TE Triggering New Topic Sense of Puzzlement	**CP-EE Exploratory** Info exchange:cmmnts on prev. raised resrce,exprs opn on prev. tweet,with no linked rsrce	**CP-IE Integration** Connecting Ideas:Drws cnnctns frm mltple tweets,@,urls, #	**CP-R Resolution** apply new ideas, resolve an issue, bring discssn to close.
194	165	25	3	1
	85%	13%	2%	1%

On closer analysis of the cognitive presence (CP) , the triggering event phase is seen to be the most frequently coded for category in both the First year twitter dataset, accounting for 85% see Table 6) as well as the overall twitter dataset ,which amounts to 81% as indicated in Table 5 lending to a clear distinction of this phase from the other phases of inquiry . This phase is typically described by the introduction of new issues or questions prompting debate. Seen as the first phase of critical inquiry, it is often initiated, in an educational context, by the teacher positing a challenge to learners (Garrison 2000). However in this study involving the Twitter activity, it is evident that it is in fact *students* who are responsible for the high frequency rate for the initializing event , demonstrating thus the democratic and non-hierarchical' (Garrison 2000) characteristic that is ascribed to computer mediated discussions or more specifically in this study, the online Twitter application. The posts/tweets were often questions to the group, for e.g.

Idealists tend to think in the short term & what the people want where realists think long term & what the nation needs. Yes/No #WitsIR

Can aid be a form of soft power? #WitsIR

Unfortunately a considerable number of these questions posed , did not enjoy further exchange on the online platform that was captured in the #WitsIR twitter stream. It is uncertain whether the tweeter received a direct reply. However in consultation with the lecturer , he confirmed that the most case questions that were posed on the platform were later addressed in class. This expectation of students to have issues, raised on the online platform, addressed in class is evinced by the following tweet :

Struggling to understand this anarchy theory a bit. Please elaborate on it again in class @.Lecturer #WitsIR

The lecturer in turn responds with :

@Student C - Anarchy = no world order No world gov't. international system is naturally chaotic. So states vie for control #WitsIR

It is assumed that the issue was then further addressed in class as confirmed by the lecturer feedback to the researcher.

It is worth considering here Efron and Winget (2010) surmising of the reason why users pose questions on Twitter. They posit that questions posted, while seemingly requiring immediate feedback, also serve to engage others and sometimes serve as rhetorical devices inducing in the Twitter users an implicit exhortation to ruminate on the post and thus maintain the conversational momentum. Thus we see how the affordance of the Twitter application, through virtue of its enabling environment for users to readily post questions, aids in the formation of a community of inquiry.

Other questions posed by students involved soliciting responses from perceived 'specialized nodes or information sources'(Siemens, 2005), conjuring the connectivist theory of learning which espouses that learning in the 21st Century is seen as a process of connections with

experts. This is demonstrated in the following tweet whereby the student attempts to get feedback from the Aljazeera News network i.e.

@AJEnglish #WitsIR - should world countries not meet more to combat these problems, than breaking the peace by waging war over oil?

Again there was no evidence of further engagement of this issue on the WitsIR twitter stream and it remains uncertain as to whether the 'expert' responded to the student directly.

An inverse relationship with 'specialised nodes' was also evident, whereby the external 'experts' through no apparent solicitation, posted to the WitsIR twitter stream amplifying triggering events(and possibly stimulating the progression of thought to the 'exploration' phase as was evinced in the tweets discussed below). Consider the 'STOP THE KONY' twitter discussion on the WitIR stream which, at the time of the study was a trending topic and involved the unsolicited participation of the campaign organisers on the WITSIR stream who proceeded with their advocacy campaign which involved the viral marketing of their Kony 2012 video . This video, produced by the American NGO , Invisible Children, was aggressively marketed on all social networking applications to generate awareness about Joseph Kony and his Lords' Resistance Army, who have been accused of abducting children . The campaign organizers for this cause presumably picked up on the KONY hashtag which was tagged on one of the first year IR students posts and then aggressively contributed to the WITSIR Twitter stream. This type of participation brought about by the affordance of the Twitter application in the unique use of its tagging conventions by users is aptly adumbrated by Hepp(2010) who defines hashtags as having " a stronger global reach than in other social tagging systems, because one does not invent tags for personal retrieval but for being visible by others".Clearly then the KONY hashtag exercise attests to this mechanism of the hashtag convention in fostering social interaction as this issue i.e. the STOP THE KONY Campaign accounted for approximately 76 of the total tweets(with 20 of these tweets residing in the cognitive presence category) resulting in this topic being the most tweeted about issue. It is interesting

to note how the number of tweets on this topic increased *after* the 'Stop the Kony' campaign organisers tweeted to the stream i.e. there were only 16 tweets referring to this topic initially which then increased by approximately 50 tweets after the campaign organisers started tweeting to this post.

This particular interaction on the online medium also brought to light the time independent attribute that an online social networking application like Twitter affords as part of its asynchronous appeal (as well as synchronous characteristics , the dichotomy of which has been earlier referred to) through allowing for reflective responses to emerge based on the absence of time constraints. Consider the change in tenor of the tweets from the initial ones expressing uncritical support for the cause campaigners which later then evolve into that of a more critical voice by the proffering of a somewhat circumspect tone in tweets. This may be seen to have arisen due to the focused and intense discussion on this topic allowing students ample time and opportunity to percolate the arguments and so delve into the second phase of the cognitive presence domain viz. the exploratory phase , desisting thus a sequacious line of thinking. This is attested by the tweets below.

#Kony2012 A cause shouldn't have to be popular. People should realise doing the right should be popular @Lecturer #WitsIR

Here the student bravely attempts a lone tweet, hinting at the almost 'bandwagon' appeal that had characterized the previous tweets in response to this topic , by the underscoring of the causes popularity, or mass appeal , as being the main stimulus for action or consideration as opposed to a response based on sound reasoning or innate sense of justice. The tweet clearly demonstrates an emerging ,considered line of thinking as the tweeter proffers an opinion, with the tweet thus coded for in the second category in the Cognitive presence i.e. the exploratory phase which accounted for only 13 % of the first year tweets and 17% of the total tweets, as indicated in Table 6 and Table 5 respectively.

Another tweet questioning the bias of the media and propagandistic intentions is volunteered soon after, almost seemingly emboldened by the previous tweeter .

if #thepowerofnewmedia could make the US get involved in the whole #Kony2012 thing, what's stopping it from #stoprape and #violence #witsir

The student questions the US governments involvement in selective events and the contribution of this tweet illustrates an emerging explorative discourse suggesting a perceived notion by the student of dissonance or inconsistency in the observed event resulting in an expression of a divergent line of thinking .

Transitioning from the triggering event to the exploratory phase is again illustrated in the following two tweets below:

According to the US Department of Homeland Security stats, about 129 South Africans were granted asylum between 2001 and 2010. #WitsIR

I don't know what SA they are on about. Mind over Matter perhaps ? http://t.co/fMFmuTl2 #WitsIR

In the first tweet the student presents information to the group but expresses cynicism about the claim and in addition provides a link to a news article on the issue of Afrikaner asylum seekers based on their allegation of perceived racial discrimination . The tweet embodies an element of inner speech in which the student opts to share her inner musings with the external world echoing the Vygostkian notion of reflective , inner speech and showing the shift from the participants inner private world to that of the shared social world.

Another example of a tweet occurring in the exploratory phase:

I'm guessing Hobes' version of the Realist theory is proving itself in Venezuela #WITSIR

Here the student relates a recently discussed tutorial topic on Realists vs. Liberals , and relates the theorists Thomas Hobbes view of self interest groups in political orders to the current Chavez presidential victory. The use of the word 'guessing' serves as an invitation for users to agree or disagree demonstrating thus the learners willingness to engage with alternative perspectives .

Thus we see substantial evidence of students sharing information and often positioning themselves tentatively on matters , almost as an attempt to solicit further discussion as demonstrated in the following selection of tweets on the issue of the Syrian Conflict

Hey #WitsIR tweeps...check out the latest in Syria. http://t.co/JzGYTUD1	Tue, 14 Feb 2012 11:06:31 +0000
The UN Veto is once again impeding the opportunity for the killings in Syria to be halted. The UN system is in need of rapid reform.#WitsIR	Fri, 17 Feb 2012 06:47:29 +0000
The UNGA needs to have more power. This Syrian massacre would have ended a long time ago. Whatever happened to R2P? #WitsIR	Fri, 17 Feb 2012 07:16:59 +0000
General article for #WitsIR: Kofi Annan appointed UN-Arab League envoy to Syria: http://t.co/7EPb5Wi9 (Reuters) @DavidJHornsby	Fri, 24 Feb 2012 08:02:41 +0000

Note the first tweet above by the lecturer prompting students to visit a link describing the Syrian crisis . This elicits a reaction from students who follow with comments on this issue, with the first tweet from a student, two days later proffering an opinion as indicated below where the student suggests the need for change within the UN based on their consideration of the events.

The UN Veto is once again impeding the opportunity for the killings in Syria to be halted. The UN system is in need of rapid reform.#WitsIR	Fri, 17 Feb 2012 06:47:29 +0000

Another tweet follows shortly, continuing the thought of the previous post and through the use of a rhetorical device, the student emphasizes her deliberations regarding the failings of the United Nation General Assembly. The tweet is retweeted shortly thereafter, signifying an endorsement of the sentiment.

The UNGA needs to have more power. This Syrian massacre would have ended a long time ago. Whatever happened to R2P? #WitsIR	Fri, 17 Feb 2012 07:16:59 +0000
RT @Student D: The UNGA needs to have more power. This Syrian massacre would have ended a long time ago. Whatever happened to R2P? #WitsIR	Fri, 17 Feb 2012 14:25:57 +0000

A number of posts by students follow thereafter (approximately 30 tweets were posted on this issue), often containing links to external resources , demonstrating the information gathering or exchange process , typical of the exploits in the exploration phases on the cognitive presence. Examples of these are depicted below

Not surprising #WitsIR RT @PressTV: 'Syria resolution beyond UN obligations' http://t.co/lB4qjT1l	Sat, 18 Feb 2012 07:22:27 +0000
General article for #WitsIR: Kofi Annan appointed UN-Arab League envoy to Syria: http://t.co/7EPb5Wi9 (Reuters) @Lecturer	Fri, 24 Feb 2012 08:02:41 +0000

Interspersed between these posts are attempts by the lecturer to focus the discussion through further questions. It is encouraging to note the open– ended questions that the lecturer employs, presumably to provoke divergent thinking, in addition to providing links to augment the student understanding of the questions.

For e.g.

#WitsIR rhetoric is ramping up b/w China, Russia & US over Syria. Think what does this mean for the balance of power? http://t.co/nQ6R

However these types of questions or prompts are few and far between with the majority of the lecturer's posts serving rather to guide students to relevant information or are comments aimed at framing the discussion and in most cases are isolated questions. Whilst this matter is dealt with under the more appropriate section on teaching presence it is worth noting its significance in light of the near absence of the coding for integration and resolution phases in the cognitive presence despite the number of tweets generated, with most of them appearing in the first two phases without any progression to the last two phases - these, the latter two phases i.e. - being the higher order thinking phases which are noticeably absent. This finding is consistent with a number of studies (Darabi et al, 2011; Kanuka and Anderson ,1998, Garrison,& Cleveland-Innes (2005).) investigating the cognitive presence in online learning. The imperative thus to investigate the teaching presence is obvious and it is to this that our focus is applied to in the next section.

Teaching Presence

Table 7 : Teaching Presence Data

Teaching Presence		
TP-DO **Design & Org**, setting curriculum & methods, typically staff:staff interactions	**TP-FD Facilitating Discourse** esp. RT or reply with external resources, solicit clarification, asking for explanations	**TP-DI** **Direct Instruction** Focussing discussion, providing guidelines on topic
81	174	211
17%	37%	45%
466		
31%		

Constituting 31% of total tweets , the teaching presence, coded for activities related to instructor involvement on the online discussion, represented a third of all the tweets signifying a substantial instructor presence. Moreover it is evident that despite this presence being representative of tweets related to pedagogical issues, by *all* participants, which includes

students, almost all of the tweets in this presence were those made only by the instructor himself or to a lesser degree by tutors on the course. The lack of student involvement in this presence indicates an immature community of Inquiry, a finding reflected in Sinnapan and Zutshi's (2011)study , which is not surprising given that most participants were first time microblogging users as well as first year students thus indicating their novice status on the subject matter .

Whilst the 'direct instruction' category accounts for majority of the teaching presence tweets, one would expect a concomitant progression through the phases of inquiry in the cognitive presence given that this component of the teaching presence is held to be the critical for the sharing of subject matter knowledge by the lecturer which involves referencing external material through sharing of resources and clarifying content through analogies as well as steering discussions in useful directions, all with the ultimate aim of 'scaffolding learning knowledge to raise it to a new level' (Swan et al, 2009). However the reported lack of progression in the cognitive presence alluded to earlier suggests that an examination of the tweets coded for in this category may be required to ascertain why a preponderance of tweets in this category, as well as the 'facilitating discourse' category does not yield the associated progression of critical thinking of the students.

Certainly it is evident that the lecturer exerts a strong presence, often posting reference to links thus injecting knowledge form external sources beyond the set classroom curriculum as described below:

RT @tutor #WitsIR - http://t.co/zimN55od. Intr2001 page with posts and links to interesting pages in African IR. Feel free to comment and join in.
#WitsIR - buckling under int'l pressure or SA asserting itself? RT South Africa's mines 'will never be nationalised' http://t.co/Rh6vF8RH

Also most of the comments posted are presented with a charge to students to either resolve a problem or ruminate on particular point as demonstrated in the following tweets:

#WitsIR - do u think Greece's economic problems compare to Africa's? http://t.co/P0ubmp7v

Change in SA ruling elite has caused repercussions internationally for SA positions. Think #UNSC #WitsIR

#WitsIR rhetoric is ramping up b/w China, Russia & US over Syria. Think what does this mean for the balance of power?

The coupling of a question to a shared resource , as evidenced in the tweets above, demonstrates the exhortation to inquiry that the lecturer employs in an attempt to get students to think critically.

In addition there is also evidence of the lecturer sharing his personal knowledge about the subject matter, hence providing intellectual leadership , as demonstrated below.

#WitsIR - just did an interview 4 Chinese State TV on Madagascar and the Roadmap for peace. check out some background.

Check out my latest blog post - A Right Presidential Flop #WitsIR http://t.co/f8CLp3AV

The lecturer thus 'models the qualities of a scholar' (Anderson 2001) through sharing instances of his scholastic endeavors beyond the classroom and further entices the learner through sharing his personal interests or passion about the subject matter - traits which are clearly suggestive of the 'direct instruction' teaching presence category.

Thus an analysis of the tweets in the above mentioned category certainly attest to the presence of some of the requisite factors that are required to engage a student to move from the lower levels of the critical inquiry process. However to what extent this cognitive apprenticeship model or the scaffolding responsibility of the more skilled peer in Vygotsky's theory of learning is adequately exploited remains the possible issue as to why the progression to higher level thinking is not exhibited in the tweets shared. Indeed as Anderson (2001) points out the need for focusing and refining discussions along with assessing student comments and providing explanatory feedback is crucial for ensuring the desired critical thinking progression. Perhaps then it is the lack of this activity, i.e. the students responses to questions posed , in the tweets analysed which could account for the stalling in the first two phases in the cognitive

presence. For whilst the lecturer poses stimulating questions on the Twitter feed, albeit infrequently, there isn't any compulsion on the students to answer these questions i.e. given the Twitter activity being a voluntary exercise with no extrinsic motivational element like tangible incentives etc. Hence because students rarely responded to the questions posed, and thus missed the opportunity to engage in the process of critical thinking , there appeared to be little evidence of the progression to higher order thinking on the online platform.

Neither is there substantial evidence of the lecturer confirming or diagnosing misconceptions – characteristic indicators of the 'direct instruction' category which describes the pedagogical expertise of the teacher . For e.g. in the following tweet a student poses a question under the guise of a statement and is almost seeking clarification of his analogy of the Hobbes economic philosophy to the current situation in Venezuela .

I'm guessing Hobes' version of the Realist theory is proving itself in Venezuela #WITSIR

This tweet which is coded for in the cognitive presence under the exploratory category , given the tacit expression of an opinion , would seem to have solicited a response from the lecturer, who could have attempted to facilitate a discussion on the matter especially since there was no reply from any other more knowledgeable tutor or student on this issue. However, as it were the tweet stands solitary , with no response to it received.

Another example is the following tweets by a student who is obviously inspired by Irwin Cotlers, the Canadian ambassador and quotes his remarks about Israel's regime . There appears to be an almost uncritical acceptance of the speakers comments, especially given that the speaker is a known Israeli advocate yet the tweets posted are not met with any critical response.

"If you want to pursue justice, you need to feel the injustice first" #IrwinCotler #WitsIR
"Apartheid is the only racist legal regime post the Nazi era" #IrwinCotler #WitsIR

"Nobody must say that Israel must respect human rights without equally respecting Israel's laws and rights" #IrwinCotler #WitsIR

One student however voices some dissension but fails to qualify her/his position.

Dunno about this "@Student E: "If you want to pursue justice, you need to feel the injustice first" #IrwinCotler #WitsIR"

Again there is no evidence of this discussion progressing further than the above posts and yet given the present Israeli-Palestinian crisis one would have imagined this issue would have provoked generous debate.

It must be borne in mind though that the questions posed by learners could have been engaged with in class as confirmed by the lecturer who reported that often this was indeed the case where issues that were initiated on the Twitter feed were sometimes addressed later in class. Indeed as Anderson et al (2001) points out this can be a time consuming process for the lecturer to respond to each online postand one could therefore reasonably assume , given the evidenced commitment of the lecturer in terms of his considerable online presence and the fact that the lecturer did indeed attest to folding back online discussions into the classroom ,that these posts served as an aggregate or an indicator of the learners understanding on certain issues and thus allowed the lecturer to gauge student's comprehension of content . The evidence therefore of students initiating discussions suggests the potentiating effect of Twitter use in attempting to promote critical thinking through extending student engagement beyond the classroom as well as providing a reciprocal feed, by generating discussions online, to be fed back into possibly smaller tutorial groups , as confirmed by the lecturer.

As indicated a substantial number of tweets were coded for the 'facilitation discourse' category which essentially describes the lecturers 'postings that stimulate social process with a direct goal of stimulating learning and group learning' and indicates attempts by the

lecturer/teacher to 'create a positive learning environment'(Anderson et al 2001) . One of the indicators often used to code for this category in this presence was the retweet indicator which describes tweets by student that were retweeted by the lecturer thus signifying *ostensible* reinforcement of student contributions. Ostensible in the sense that the retweet action here did not necessarily equate to the lecturer wanting to amplify the significance of the tweet but more so as an attempt to push the tweet onto the class feed by adding on the requisite hashtag due to its omission by the poster in the original tweet. Thus although there were a number of retweets by the lecturer, which ordinarily would suggest the endorsement of students tweets, thus qualifying for the code 'facilitating discourse' , this cannot be conclusively proven as explained above and hence the facilitating discourse category may suggest an unrealistically inflated figure.

Nonetheless, focusing on the other tweets coded for the facilitating discourse category , it is worth noting how the lecturer varies his tone by adopting on occasion sardonic expressions presumably to provoke student participation as described below:

Increasing rhetoric on #Syria by US & international community...but where is South Africa's voice? MTN cut off their phones. #WitsIR

Humour and the use of colloquial expressions are other devices often employed by the lecturer as evinced in the lecturer's tweets below.

Wanna know why states cooperate? #WitsIR Think of it as a game of stripping! http://t.co/iDsvsZkm
#WitsIR...it is decided, my students are SMART! #yourock

It is thus without a doubt that the lecturer attempts to employ various devices, including a high level of involvement , to ensure that students are engaged and as such does indeed achieve the establishment of a robust conversational flow with active student participation albeit lacking

substantial evidence of advancement through the higher phases of the cognitive presence. Darabi et al (2011)posits several techniques that can be applied to circumvent the problem of cognitive presence ebbing at the initial phases which includes asking well-crafted questions that will stimulate students into asking more questions. These are further described as 'online scaffolds' which are a series of detailed prompts, formed through the lecture anticipating the difficulties students might have in generating questions to ensure meaningful discourse. This approach however is time consuming and may not be practical in a large class engaged in 'numerous simultaneous group discussions' (Darabi et al,2011), as evidenced in this study. Indeed as Garrison and Cleveland-Innes (2005) point out "It is not educationally desirable or reasonable from a time-management perspective to have the teacher respond to each comment. But it is crucial that the teacher moderate and shape the direction of the discourse." and they suggest further techniques such as communicating clear participation requirements and expectations as well as providing engaging questions and focusing discussions to 'ensure that discourse is progressive' .

In any event the 'facilitating discourse' category of the teaching presence, which prompted the above discussion, serves primarily to support dialogue with a minimal shaping of the discussion. As such it thus potentiates the creation and sustaining of a social presence (Anderson et al, 2001), which is the bedrock of the development of a community of inquiry and to which our attention is now turned to in the next part of the report.

Social Presence

Table 8 : Social Presence Indicators

Social Presence		
SP-A **Affective** Expressing emotions, humour, emoticons, emotionally loaded words, and value laden judgments	**SP-OC** **Open Communication** Risk free expression , bold, controversial statements, personal confessions	**SP-GC** **Group Cohesion** encouraging collaboration replies with opinion or asks for clarification, RT with dis/agreement
242	127	255
39%	20%	41%
624		
41%		

Consistent with most research findings as alluded to by Sinnapan (2011), the social presence in this study accounted for the majority of tweets i.e. approximately 41% of the total tweets were coded for in this presence as indicated in the table above. In addition the scenario that unfolded is typical of other research reports(Shea et al, 2010) which suggest a correlation between teaching presence and student presence.

Of these tweets coded for in the social presence , most of them contained elements of either the Group Cohesion factor (41%) and to a lesser extent the Affective domain (39%). Whilst we are cautioned by Garrison and Cleveland-Innes (2005) against assuming that high student interaction in this presence ,which may correctly be reflective of group cohesion, equates *directly* to the creation of cognitive development, it is interesting to note though the preponderance of messages in the two categories cited above i.e. Group Cohesion and Affective Expression. These categories are both reported to *influence* cognitive thinking

development (Garrison et al, 2006) given the association of task motivation and persistence, often indicated by affective expressions, as a key ingredient for the development of critical inquiry as well as group collaboration which also serves to promote critical inquiry through the formation of group identity and the subsequent empowering of participants to collaborate meaningfully (Rambe, 2012). Thus the study certainly demonstrates evidence of the 'precondition for a purposeful and worthwhile learning experience' (Garrison & Cleveland-Innes, 2005). In addition the affordance of the microblogging tool to promote social presence beyond that of mere random, irrelevant, non-factual tweets, as indicated by Saeed et al (2012) , is also clearly demonstrated as we note the enriched learning experience evidenced in the following tweets by students on their positive experience of the lecturers teaching style as well as the course content.

@Lecturer #WitsIR #yourock I love how u using this platform to communicate with your students doc!

Enjoyed my #witsIR lecture today. Can't believe I'm saying this BUT I can't wait for tomorrows lecture @Lecturer (bbm can't watch face)

#WitsIR looking forward to today's speaker. @Lecturer, most lively lecturer I've seen

I'm really looking forward to my IR lectures this year!!! #WitsIR ....yay!!!!

First class tomorrow INTRNATIONAL RELATIONS!! Yeah worth waking up at 5 for #WitsIR!

@Lecturer wow lecture today was awsum best class I had today actually!!! Can't wait for our nxt lecture #witsIR

It is clearly evident that these superlative evaluations, attest to the students immense satisfaction with their learning environment and as such must bode well for the sustaining of a collaborative learning climate to ensure deeper learning. Furthermore these compliments were in turn reciprocated by the lecturer, as depicted below, thus serving to foster collegial relationships which are hallmarks of a vibrant community of inquiry .

Loving my #WitsIR tweeps...being studious and taking notes. #yourock

#WitsIR...it is decided, my students are SMART! #yourock

In addition there is also evidence of attempts at fostering epistemic engagement between students and lecturer as described below :

@Lecturer look forward to discussing Canadian politics with you. Would be interesting to hear a Canadian's perspective #WitsIR

Here reference is made to the lecturer's personal background, which lends to the promotion of cohesive social relations and demonstrates the intimacy that the microblogging application affords by allowing the student, in this case, to directly access the lecturer and intimate their interests in the face of a community of learners. The lecturer in turn responds and validates the students interest by sharing the information of a guest lecturer's upcoming visit.

@Student F - FYI - Hon Irwin Cotler is coming to our class next Tuesday. #WitsIR

Interestingly another tweet, appropriately coded for Open communication , given its bold and obvious risk-free expressiveness, describes a student's dissatisfaction with the perceived ostensible biasedness of course content and masks a veiled attack at the lecturer, who is known to be of Canadian origin.

#WitsIR is such a westernised & biased subject, its supposed to be international but all we ever hear about is how good the Canada is

Practical attempts at Group Cohesion is evinced in the following tweet where the student shares her enthusiasm for the twitter activity and encourages other first years to make use of the application. The second tweet further demonstrates the students attempts to exploit the tool to forge collaborative learning :

Just met a 1st year Witsie studying IR, told her to jump on the bandwagon and get on Twitter for #WitsIR

#WitsIR Anyone forming or olredy in a study group for IR, wld lav to join, leave ur details will contact u.

In the latter tweet, the student adopts the typical syntactical structure of abbreviations and colloquial use which is characteristic of Twitter use. In addition the immediacy afforded by Twitters synchronous modality , provides an apt platform for constant conversational flow and so assists in the emergence of the nonconscious aspect of speech reflecting "[Vygotsky's] inner speech, which connotes intimacy" (Rowe, 2009 in Schandorf, M. 2012). This affordance also assists in serving to bridge the gap between verbal and written fluency of second language learners (Peyton and Mackinson-Smyth, 1989) and thus allows for uninhibited flow of conversation, which is unfettered by grammatical rules demanding accuracy. This enables the fostering of linguistic fluency by students who may not be very conversant with English and in so doing , thus encourages participation in discussion. At the same time this interaction on the platform provides an opportunity for second language learners to enhance their language skills through interacting with those students with a better command of the language, demonstrating therefore an online Vygotskian zone of proximal development interaction with more capable others, as described by Warnken(2012) .

As mentioned earlier phatic expressions or affect, 'an element deemed important to the development of trust characteristic of a community of inquiry'(Shea et al 2010) are significant especially in a text–based environment given that facial cues and other non-verbal means cannot be expressed to establish and maintain social presence, appear frequently as cited below :

Exam handed in, and Dr D. Smiles with #FistUpInAir, ahhh, its been a good semester.#WitsIR☺

#WitsIR http://t.co/fOvWHdsq just in case some of you guys didn't knw wtf was goin on in syria, like my dumbass... here's some insight.

sigh #WitsIR RT @SAfmnews: Scores of people have been killed in an explosion in the Syrian city of Hama.

In the spirit of 'workers day'... I sit, chained to my desk, working on my policy brief. #WitsIR
#WitsIR policy brief grade has made my day! Officially set in stone, this will be a major ☺ thank you @DavidJHornsby;
#NP #PhillCollins while doing my IR exam #WitsIR *dancing on my chair like a mad person* :D
Aljazeera has become my new favourite channel ☺ haha #WitsIR

Indeed the element of 'fun' abounds in this course as demonstrated by the tweets that were expressed for the social presence. Given that the 'primary importance of this element is its function as a support for cognitive presence, indirectly facilitating the process of critical thinking carried on by the community of learners(Garrison et al,2001) I thus infer that this study generated the requisite social presence for the potential achievement of critical thinking.

Limitations of design

Cohen's claim which is often cited in qualitative research studies i.e. the potential for 'selective, biased, personal and objective' (Cohen et al., 2007:256) results bear relevance to this study given that it is a case study with a qualitative focus albeit a mixed method approach. Thus it is imperative that researcher bias be acknowledged in the intrepretation of data. The key limitation of this study however is the small sample which may not be generalizable to other student populations in different contexts.
Furthermore the lack of student perception data given the low response rate on the post Twitter activity survey further limits the generalizability of this study and fails to provide the

requisite data to validate the conjectures based on the posted comments regarding students satisfaction of the course - comments which could have been unduly influenced by the lack of anonymity on the online application. Given that the predictors of student satisfaction is linked to the successful engagement in a course, the significance of the issue of students unfettered perceptions to their online experience in terms of the social, teaching and cognitive presence is apparent as it would serve to provide "invaluable information about the submerged dynamics and tensions that are either inhibiting or enhancing learning " (Morris, 2010) and would thus illuminate the required interventions instructors could apply in their teaching design.

In addition it is also recommend that future research incorporate , in addition to a larger study sample with varied courses from different disciplines , a comparison between two cohorts with varying teaching design.

The study also did not correlate students actual grades with their online Twitter activity. This correlation could have possibly have served to corroborate manifestations of critical thinking engagement with successful grades.

Finally given that this study focused on critical thinking, which relied on indirect , observable evidence, the possibility of underrepresentation of critical thinking progression must be anticipated as it was impossible to be absolutely certain that all students who participated in the activity, opted to record their thinking progression on Twitter i.e. there may well have been instances of critical thinking which did not manifest on the online platform but may have been potentiated by the microblogging activity.

Chapter 7: Conclusion

This study aimed to investigate the potential of microblogging to facilitate critical thinking by answering the following research questions :

Does the use of Twitter assist in the development of critical thinking skills?

- In particular does it promote enquiry, reflection and feedback?
- Does the limited 140 character input space, aid the writing of concise statements and thus instilling academic rigour in the crafting or culling of succinct statements or does it present a constraint to students to communicate their thoughts?

Does Twitter-use by students provide access to informational resources i.e. to what extent do students exploit the use of Twitter to communicate with experts or search for information etc.?

Does Twitter-use provide for an expanded opportunity for students from previously disadvantaged backgrounds and/or inhibited students to participate more actively?

- Is its use affected by issues of physical access?

Whilst it was evident that the study failed to demonstrate the progression to the integration and resolution phases of the cognitive presences which indicates higher level of thinking i.e. critical thinking , it certainly did reveal the *potential* for this advancement to occur, on a microblogging platform , if the appropriate deployment of social and teaching presence was ensured. Indeed the triggering event in the cognitive presence yielded a substantial number of tweets and as such provided a fecund pool of issues with which to potentially nurture the development of higher level thinking, and so utilise the microblogging platform for educationally relevant aims through the provision of a dialogic space . In addition the study provided strong evidence of student participation and engagement, with numerous posts validating learners positive appraisal of the microblogging activity. Along with the consistent teaching presence evidenced, a positive learning environment evolved but it was lamentable that there appeared to be no progression to higher level thinking. Culpability for this dereliction of deep learning advancement may well lie then with the lack of sound pedagogical

design which involves employing intensive ,maieutic questioning strategies, providing novel incentives for active participation as well as making available ample opportunities for student engagement to ensure the occurrence of dialogic reasoning which will allow progression to deeper thinking or learning. Thus this study served to demonstrate the potential of the microblogging application to promote critical thinking , with the proviso that this could only be achieved if certain conditions ,as described above, and which largely pertain to the pedagogical design of learning activities , are satisfied .

The study also demonstrated that the structural parameters of the Twitter microblogging , in its 140 limited character input, did not hamper the students in their crafting of posts as majority of posts were intelligible and comprehensible despite being replete with containing the characteristic twitter syntactical grammar style .It is regrettable though that students failed to answer the post activity questionnaire, thus depriving this study of valuable insights into students perceptions of Twitters affordances, of which we can only conjecture ,based on their tweets, that it served sufficiently to communicate students thoughts.

In so far as to whether the use of Twitter aided access to informational resources, this was clearly evident in the number of links shared by the students , along with those provided by the lecturer, in addition to the evidenced addressivity of external sources on information documented in the interpretative analytical exercise engaged in the discussion of the various presences . Physical and epistemic access also did not present a challenge given the majority of students having access to devices and bandwidth as well as demonstrating ease of use of the microblogging application.

Hence this study, whilst not able to demonstrate instances of critical thinking per se, certainly provided compelling evidence on the *potential* of microblogging to support critical thinking but stresses the imperative for effective teaching presence for this to occur without which the social media tool may well be limited to serving as a mere course 'energizer' . The latter use is in itself is not an entirely wasteful endeavor in its application as motivational activity but,

needless to say, would limit the potential of the microblogging tool to achieve higher thinking skills.

Finally the study, in exposing inadvertently the feet of clay of emerging opportunities afforded by new information communication technologies implemented without the application of appropriate pedagogies, provides a cautionary note against carte blanche acceptance of the hype on the educational efficacies of ICT's . As such the study advances the notion of harnessing technology with a considered approach in educational practices and guarding against the technological tail wagging the pedagogical dog.

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Appendix A

Pre Twitter Activity Questionnaire

1. Do you intend to participate in the Twitter activity designed for this class?

a. Yes
b. No

Answer: _____

2. If you answered 'No' you may end this survey now but please indicate the reason why you have chosen not to participate.

3. Select your age from the groups below

a. under 18
b. 18-20
c. 21-23
d. 24+

Answer: _____

4. Will this be your first time on Twitter?

a. Yes
b. No

Answer: _____

5. If you answered 'No', please state how long you have been on Twitter.

6. Please provide your Twitter Username in the space below if you intend to participate in the Twitter Discussion. (If you have not yet registered, but intend to do so, please fill in the Survey after you have done so.

7. Indicate your gender:

a. Male
b. female

Answer: _____

8. What degree are you studying towards and which year of study are you completing?

9. How many years have you been studying at University?

a. under 1 year
b. 1-2 years
c. 2-3 years
d. 3-4 years
e. 4 years +

Answer: _____

10. Name the High School you attended:

11. Was the High School you attended Private or a Public school?

a. Public
b. Private

Answer: _____

12. Do you have your own cellphone?

a. Yes
b. No

Answer: _____

13. If yes, specify the payment process.

a. Prepaid
b. Contract
c. Not Applicable

Answer: _____

14. Have you registered for Mobile Wifi access on the WITS intranet at http://intranet.wits.ac.za/Support/CNS/ServiceForms/CNS_WiFi_Mobile_Access_Request_Form.htm ?

a. Yes
b. No

Answer: _____

Appendix B

INTERNATIONAL RELATIONS 1012 PARTICIPANT'S CONSENT FORM

Dear Research Participant

Information and Consent to Participate in a Research Project

My name is Fatima Rahiman. I am a student at the School of Education at the University of the Witwatersrand. I am doing research on the use of online applications in higher education.

My research topic is "The potential of microblogging with Twitter to promote critical thinking in Higher Education."

My research thus involves analyzing a corpus of microblogging texts generated during an engagement with your social work undergraduate course and therefore I would be grateful if you would elect to participate by microblogging on the Twitter application to the hashtag #WITSIR for the duration of your INTR1012 course. Should you agree to participate you will also be required to complete two brief online questionnaires which should take no longer than 10 minutes each.

If you have any concerns about participation, or any questions that you would like to ask about the study please contact me at any time at the email address below
Fatima.rahiman@wits.ac.za

CONFIDENTIALITY
Your name an identity will be kept completely confidential at all times and particularly in all academic writing about the study. Your individual privacy will be maintained in all published and written data resulting from the study.

DATA
All data will be destroyed two years after the research has been completed.

RISKS AND BENEFITS/PAYMENT
There are no foreseeable risks in participating in this study. You will not be paid for participating in the study. Any information picked up by the researcher during the research will have no impact on your grades.

Benefits of the project will be a potential contribution to enhanced teaching and learning practices.

TIME INVOLVEMENT
Classroom observations will take place during class time.
SUBJECTS RIGHTS

If you have read this form and have decided to participate in this project, please understand your participation is voluntary and you have the right to withdraw your consent or discontinue participation at any time without penalty. Your individual privacy will be maintained in all published and written data resulting from the study.

CONSENT

Please complete, sign and return the form below, indicating whether you agree or do not agree to participate by circling the appropriate choice below.. Also, state whether you are 18 years or older.

I……..am **willing/not willing** to participate in the research study on "The potential of microblogging with Twitter to promote critical thinking in Higher Education" conducted by Fatima Rahiman at the University of the Witwatersrand.

I am 18 Years or Older ☐ YES ☐ O (TICK BOX)

Signature: _____

Email Address:_____

Date:_____